A RETROSPECTIVE STUDY REGARDING THE RELATIONSHIP BETWEEN ANTENATAL CARE (ANC) ADEQUACY AND PRETERM BIRTH

by

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SUPERVISOR: PROF L MODIBA

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STUDENT NUMBER: 48783579

DECLARATION

I declare that **A RETROSPECTIVE STUDY REGARDING THE RELATIONSHIP BETWEEN ANTENATAL CARE (ANC) ADEQUACY AND PRETERM BIRTH** is my own work and that all sources that I have used or quoted have been indicated and acknowledged by means of complete references and that this work has not been submitted before for any other degree at any other institution.

……. 15 November 2015

Sikhangezile Gwatikunda **DATE**

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ABSTRACT

The purpose of this study was to investigate the relationship between antenatal care (ANC) adequacy and preterm births. The researcher used the quantitative, descriptive, correlational, retrospective, case control design on a sample size of 40 cases and 80 controls. A checklist was used to collect data at one state hospital in Windhoek. When the Adequacy of Prenatal Care Use (APNCU) index was applied, premature birth was found to be less likely for women in the higher categories of care (OR 0.121; 95% CI 0.124–0.613) as compared to those in the lower categories. Similarly when the Content and Timing of care in Pregnancy (CTP) tool was used; women in the higher categories of care, were less likely (OR 0.114; 95% CI 0.012–1.056) to give birth prematurely as compared to those in the lower categories.

KEY CONCEPTS

Preterm birth; antenatal care; antenatal care adequacy.

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I was enabled to accomplish this work by the Most High God and I therefore give all glory and honour to Him.

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Dedication

I dedicate this dissertation to my late sister,
Sibongile Gumbo who taught me the real meaning of love.

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LIST OF ABBREVIATIONS

The following abbreviations were used in this study:

ANC	Antenatal care
APNCU	Adequacy of Prenatal Care Use
CTP	Content and Timing of care in Pregnancy
FANC	Focused antenatal care
HIV	Human immunodeficiency virus
MDG	Millennium developmental goal
MoHSS	Ministry of Health and Social Services
NDHS	Namibia Demographic Health Survey
NICE	National Institute for Health and Care Excellence
PMNCH	Partnership for Maternal, New-born and Child Health
SPSS	Statistical Package for Social Sciences
STIs	Sexually transmitted diseases
UNICEF	United Nations International Children's Emergency Fund
WHO	World Health Organization

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CHAPTER 1

OVERVIEW OF THE STUDY

1.1 INTRODUCTION

According to March of Dimes, Partnership for Maternal, New-born and Child Health (PMNCH), Save the Children and the World Health Organization (WHO) (2012:2), preterm birth is ranked as the world's largest killer of new-born babies, causing more than 1 million deaths each year. Beck, Wojdyla, Say, Betran, Merialdi, Requejo, Rubens, Menonf and Van Look (2010:31) found that preterm birth is also associated with increased rates of cerebral palsy, sensory impairment and learning difficulties, as well as respiratory problems. The WHO (2012:1) rated the preterm birth rate for Namibia at 14.4%.

The risk of preterm birth is reduced in women who receive antenatal care (ANC) services. This can be attributed to a variety of interventions carried out during antenatal care. The WHO recommends four ANC visits as a minimum. However, Beeckman, Louckx, Downe and Putman (2012a:366), postulated that the quantity of ANC (that is, number of ANC visits) should be combined with ANC quality (that is, content of care) in order to reduce pregnancy complications such as preterm birth.

Of note is that less than 7% of the pregnant women in the Khomas region of Namibia, where this study was conducted, receive ANC check-up during the first trimester and about 40% initiate ANC in the third trimester (McLaughlin, Van Olts & Whelan 2010:104). Literature on preterm birth and ANC in Namibia is mainly on the timing of initiation of care and the number of ANC visits. This study was conducted at one state referral hospital in Windhoek, which is in the Khomas region of Namibia.

This chapter starts off by outlining the background to the research problem, the research problem, aim of the study, the significance of the study and definition of terms. The theoretical foundations of the study, the research design and method and the scope and limitations of the study are then described and finally the structure of the dissertation is going to be outlined.

1.2 BACKGROUND AND INFORMATION TO THE RESEARCH PROBLEM

Worldwide, preterm birth has been on the rise in the past two decades (Tedesco, Passini, Cecatti, Carmago, Pacagnella & Sousa 2012:1638), and over 60% of preterm births occur in Africa and South Asia. Among the top ten countries with the highest numbers of preterm births are Brazil, the United States of America, India and Nigeria (March of Dimes et al 2012:2, 12). In Namibia, about 14.4 babies per 100 births were reported to have been born preterm in 2010 (WHO 2012:1)

Different causes of preterm birth have been identified. These range from multiple pregnancies, infections and maternal conditions such as diabetes and high blood pressure, age at pregnancy, pregnancy spacing, to lifestyle and work-related issues (WHO 2014:2; March of Dimes et al 2012:20). Folger (2014:1795), found the relative risk of preterm birth to be higher in adolescent women infected with Chlamydia trachomatis and also that early detection and eradication of this infection reduces the risk of preterm birth significantly. Preterm birth has also been found to be associated with the unavailability of tocolytic medications (Beck et al 2010:35).

Since prematurity is the leading cause of death in new-borns and the second leading cause of death in the under 5's (March of Dimes et al 2012:10, 11), addressing the problem of preterm birth in low-income countries may contribute to the achievement of the fourth Millennium Developmental Goal (MDG 4), which is to reduce child mortality by two-thirds by the end of the year 2015.

Preterm birth is indeed ranked as the world's largest killer of new-born babies, causing more than 1 million deaths each year (March of Dimes et al 2012:2). This is supported by Kabeera (2014:1) who reported that, according to research, worldwide, direct complications from preterm birth were responsible for approximately 965 000 deaths within the first 28 days of life and for 125 000 deaths between the ages of one month and five years of life. Furthermore, Blencowe, Cousens, Chou, Oestergaard, Say, Moller, Kinney and Lawn (2013:2) stated that, of the 3.1 million neonatal deaths worldwide, 1.08 million (35%) were caused by preterm birth complications.

Preterm birth has not only been associated with neonatal mortality but with other co-morbidities as well. According to Beck et al (2010:31), preterm birth has been found to

be associated with increased rates of cerebral palsy, sensory impairment and learning difficulties, as well as respiratory insults. It is on this backdrop that preterm birth requires as much attention as possible.

ANC provides an entry point for interventions which give health workers the opportunity to detect risky conditions in pregnant women and therefore refer them for early management, leading to better pregnancy outcomes such as term births (Ajibade, Oladeji, Oyedele, Amoo & Makinde 2013:190). This is supported by Lincetto, Mothebesoane-Anoh, Gomez and Munjanja (2006:51, 52), who state that the screening for and management of obstetric complications, sexually transmitted infections including HIV, provision of malaria chemoprophylaxis and tetanus toxoid immunisation together with the promotion of healthy behaviours and parental skills form a package of the essential interventions in ANC.

March of Dimes et al (2012:47) cite Iams et al (2008), as stating that the risk of preterm birth is reduced in women who receive ANC services. This can be attributed to the interventions carried out during antenatal care such as blood pressure monitoring, laboratory screening and foetal monitoring through ultrasonography among others.

Ultrasound scan is associated with the reduction of labour induction following misdiagnosed post-term pregnancy (Belizán & Cafferata 2011:2). Blood pressure monitoring is essential in the diagnosis of pre-eclampsia. According to Sellers (2012:243), ANC is essential for the diagnosis of pre-eclampsia/eclampsia and the initiation of the management of these two conditions should they be identified. This has the effect of reducing the likelihood of either the induction of labour before term or spontaneous preterm labour associated with these conditions.

Routine blood tests in ANC include haemoglobin (Hb) check, rapid plasmin reagent for syphilis, ABO grouping, Rhesus factor, Hepatitis B and HIV (Sellers 2012:190). Since infections in pregnancy such as syphilis, Hepatitis, HIV and other sexually transmitted infections (STIs) have been found to be associated with preterm birth (March of Dimes et al 2012:20), screening and treating pregnant women for these infections may contribute to the reduction of preterm birth.

Some of the interventions that can benefit women at risk of preterm births include insertion of the shirodkar suture for those with short cervixes and progesterone supplementation (Rochman 2012:1). Such interventions are only accessible during ANC to those women who attend ANC early enough and consistently.

Olusanya and Ofovwe (2010:985) found that most of the risk factors for preterm birth such as poor housing, sanitation, lack of ANC and premature rupture of membranes were actually modifiable. The authors asserted that improved obstetric care and improved maternal health seeking behaviours could help modify these risks and hence reduce preterm birth, especially in developing countries.

According to Zhao, Yang, Pan, Smith and Xu (2012:2), studies have shown that the initiation of ANC within the first trimester is indeed associated with the reduction of unfavourable pregnancy outcomes. This is so because women who have their first ANC visit in the first trimester are more likely to get timely information on all the antenatal screening tests obtainable as compared to those who start ANC after the first trimester.

Seeking ANC early and throughout pregnancy is of benefit in the prevention of adverse pregnancy outcomes. The WHO recommends 4 ANC visits as a minimum. However, a study by Beeckman et al (2012a:366), showed that quantity alone is not enough to reduce pregnancy complications such as preterm birth; rather quality should be combined with quantity. In their study, these authors found a significant association between the content and timing of ANC and preterm birth when the Content and Timing of care in Pregnancy (CTP) tool was used. Krueger and Scholl (2000:485) support the above findings in a study on the adequacy of antenatal care and pregnancy outcome, where they found that when the Kessner (Adequacy of Prenatal Care) and the Kotelchuck (Adequacy of Prenatal Care Utilisation) indices were applied, woman who received inadequate care had a greater risk of giving birth prematurely when compared to those who received adequate ANC. These findings show that ANC plays a role in the reduction of preterm birth. Unfortunately the quality of ANC throughout Sub Saharan Africa is negatively affected by resources among other factors.

Literature shows that there is still a need to scale-up ANC services in terms of both uptake and quality of care. The WHO (2015:1) states that about 83% of women received ANC at least once during pregnancy worldwide between 2007 and 2014. The

proportion of women who received a minimum of four antenatal visits was however only 64%.

Lincetto et al (2006:51) state that although ANC is a success in Africa since about 69% of pregnant women have at least one ANC visit, there is, however, need to achieve four visits and ensure the provision of evidence based interventions.

Less than 7% of pregnant women in the Khomas region of Namibia receive ANC check-up during the first trimester and about 40% present in the third trimester. The Khomas region has the highest population in Namibia when compared with other 12 regions, yet it has the poorest utilisation of antenatal care services (McLaughlin et al 2010:104). This literature motivated the researcher to conduct a study with the purpose of investigating the relationship between ANC adequacy and preterm births.

1.3 RESEARCH PROBLEM

Adequate ANC in terms of both the number of ANC visits per pregnancy and the timing of initiation of care and the content of care results in better pregnancy outcomes such as babies born at term. However, a few studies done in Namibia indicate that ANC attendance in terms of the recommended 4 visits per pregnancy and initiation of ANC in the first trimester is generally low. In the 2006 and 2007 Namibia Demographic Health Survey (NDHS), the Ministry of Health and Social Services (MoHSS) and Macro International Incorporated (2008:19) reported that although 95% of pregnant women received ANC at least once, only 70% attended ANC at least four times during their pregnancy and more than 60% initiated ANC after the first trimester. In the Khomas region where the study took place, only 7% initiated ANC in the first trimester whilst 40% initiated in the third trimester (McLaughlin et al 2010:104). Moreover, there is barely any literature linking ANC content of care and timing of ANC and better pregnancy outcomes. At the same time the preterm birth rate is high, rated at 14.4 preterm births per 100 births in 2010 (WHO 2012:1). Thus the researcher was motivated to conduct a study to investigate the association between ANC adequacy and pregnancy outcomes, specifically, preterm births.

1.4 PURPOSE OF THE STUDY AND OBJECTIVES

Joubert and Ehrlich (2007:60, 63) define the research purpose as a precise statement which expresses the main subject being described or the principal hypothesis being tested and specific objectives as specific information the study will yield, linked to the purpose or aim.

1.4.1 Research purpose

The purpose of this study was to investigate the relationship between ANC adequacy and preterm births.

1.4.2 Research objectives

The objectives of this research were:

- To describe the adequacy of the ANC received by women who delivered at an identified state hospital in Windhoek between March 2015 and June 2015.
- To determine the level of association between ANC adequacy and preterm birth.

1.5 SIGNIFICANCE OF THE STUDY

It is expected that the findings of this study will help inform health caregivers on the aspects of antenatal care which can help reduce the incidence of preterm births. Health policy developers can also utilise the study findings in improving health policies so as to promote ANC adequacy, especially by emphasising on the quality of care. The findings are also expected to be possibly used in raising awareness among mothers on the importance of ANC regarding positive pregnancy outcomes, which are live healthy babies. Any gaps in literature presented in this study can be a foundation for future research in this area.

1.6 DEFINITION OF TERMS

Preterm birth: Sellers (2012:278) defines preterm birth as birth that occurs after viability (which is 28 weeks in South Africa and Namibia) but before 37 completed weeks of pregnancy.

Perinatal death: Fraser, Cooper and Nolte (2006:970) define the perinatal period as the period from 28 weeks of gestation (or 1000 g foetal mass when the gestation is not known), up to the first 7 days of neonatal life in developing countries. The period in the developed countries is from 22 weeks gestation (or 500 g foetal mass) up to 7 days of neonatal life. Perinatal death is thus death of the neonate or foetus during this period.

Neonatal period: According to Fraser et al (2006:970), the neonatal period is the period from the birth of the baby to less than 28 days after birth. Neonatal death is therefore the death of the neonate during this period.

Antenatal care: Antenatal care is the use of a scientific nursing process by the midwife to assess and plan care for each pregnant woman on an individual basis (Sellers 2012:172).

Antenatal care adequacy: This is a measure of the sufficiency of antenatal care in terms of both the number of ANC visits and the content of care. The Adequacy of Prenatal Care Use (APNCU) index designed by Kotelchuck and the Content and Timing of care in Pregnancy (CTP) tool designed by Beeckman et al (2012a:366), were used to measure antenatal care adequacy.

Content of antenatal care: The CTP tool looks at blood pressure monitoring, ultrasound scan and blood sampling as important components of content of antenatal care (Beeckman et al 2012a:366).

Blood pressure monitoring: Fraser et al (2006:245) state that the accurate measurement of blood pressure is crucial so as to confirm wellness or to diagnose hypertension (or hypotension). Blood pressure monitoring should be done throughout pregnancy at each ANC visit or even more often if it is found to be abnormal.

Ultrasound scan: This is a procedure done to assess and monitor many aspects of the pregnancy. When done early, that is in the first trimester, it saves the purpose of determining viability and the detection of foetal abnormalities Fraser et al (2006:394-396). According to the CTP tool, the adequate number of scans during pregnancy is at least 2 (Beeckman 2012a:368).

Blood sampling: Blood tests are used for screening and more precise testing is done if a problem is suspected. Some of the tests include determining ABO blood group, Rhesus factor, haemoglobin levels (to rule out anaemia) and screening for diabetes and sexually transmitted infections, including HIV Sellers (2012:189, 190). According to Beeckman et al (2012a:368) when applying the CTP tool, the desirable number of times a pregnant woman should have a blood sample taken is at least 2.

Trimester (in pregnancy): Sellers (2012:762) simply describes it as the three month periods into which the nine months of pregnancy is divided. According Mosby's Medical Dictionary (2013:"trimester"), a trimester is one of the 3 months into which pregnancy is divided with the first trimester starting from the first day of the last normal menstrual period up to 12 weeks, the second stretching from the 12th week up to 28 weeks and the final trimester starting from the 28th week up to the time of delivery. To avoid the overlap between the trimesters, the researcher used 12 weeks as the cut-off point for the first trimester and 27 weeks as the cut-off point for the second trimester, hence the second trimester was considered to start at 13 weeks and ending at 27 weeks and the third trimester was considered to have started at 28 weeks, ending with the time of delivery.

1.7 THEORETICAL FOUNDATIONS OF THE STUDY

The theoretical framework chosen for this study is Donabedian's framework of health care quality (Figure 1.1 on page 10). According to Du Plooy-Cilliers, Davis & Bezuidenhout (2014:55), a theoretical framework is a collection of views and concepts that relate to the phenomenon under study. Polit and Beck (2012:128) point out that it is largely the foundation of a study.

Donabedian described a framework for assessing the quality of care that is flexible enough to apply to many situations. The relationship between three related concepts is as follows:

- **Structures of health care**: These are the physical and organisational aspects of care settings such as facilities, equipment, personnel, operational, and financial processes supporting medical care.
- **Processes of patient care**: These rely on the structures of health care to provide means and mechanisms for participants to provide patient care activities. Some of the process elements include the service process, appropriateness, use of diagnostic tests and treatment delays.
- **Outcomes of medical care**: These are appreciated when the processes improve patient health in terms of promoting recovery, functional restoration, survival and even patient satisfaction (McDonald, Sundaram, Bravata, Lewis, Lin, Kraft, McKinnon, Paguntalan & Owens 2007:113).

In the literature review and in conducting this study the above named concepts were realised as described below.

Structures of health care: Banda, Michelo and Hazemba (2012:34) state that limited resources in the family and negative perceptions resulting from previous pregnancy experiences could be the reason why women of high parity and gravidity have a tendency of initiating ANC late. The level of education of the pregnant woman has also been found to have an influence on ANC attendance. In the 2000 Namibia Demographic Health Survey (MoHSS 2003:17), it is reported that in Namibia, among the uneducated women, the proportion that did not receive ANC at all was more than one in five women, and 99% of the educated women did receive ANC. Parity, gravidity and educational status were some of the sample characteristics that were analysed in this study in relation to ANC adequacy.

The geographic location of a facility can also influence ANC quality of care. According to Banda et al (2012:34, 35), lengthy travelling time due to long distances from health facilities can deter pregnant women from initiating ANC early. The authors also state that the value attached to ANC attendance was found to be less in rural communities hence it was typical of women in the rural areas to attend ANC late.

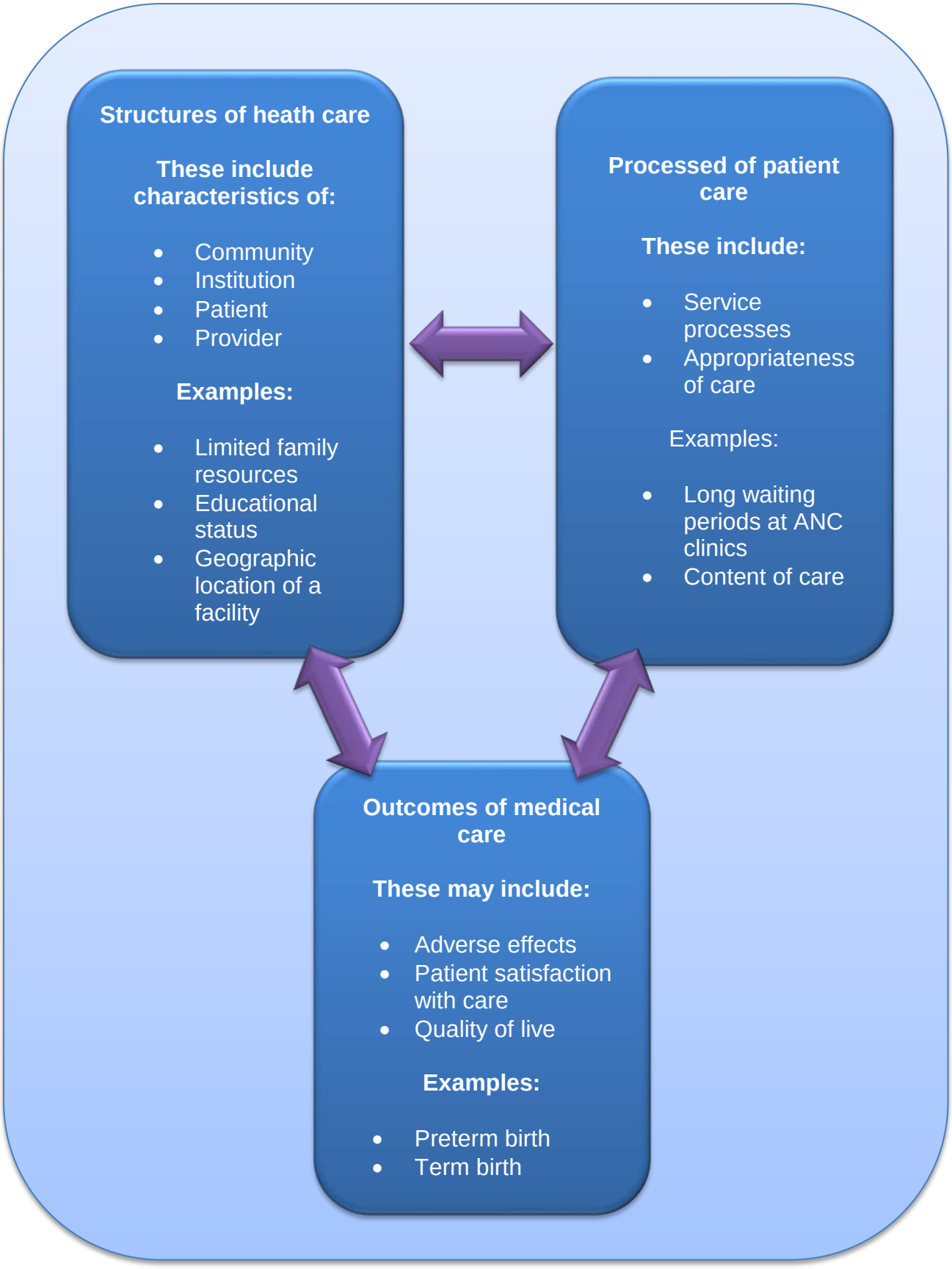

Figure 1.1: Donabedian's framework of health care quality

Adapted from McDonald et al (2007:113)

Processes of patient care (process elements): Banda et al (2012:34) state that long waiting periods before receiving service at the health facility also hinder pregnant women from initiating ANC early. Beeckman et al (2012a:366) designed the CTP tool for assessing ANC adequacy. ANC adequacy is assessed in terms of the timing of the initiation of ANC and the timing and occurrence of blood screening tests, ultrasound examinations and blood pressure measurements during ANC. Screening tests during pregnancy include haemoglobin (Hb) check, rapid plasmin reagent for syphilis, ABO grouping, Rhesus factor, Hepatitis B, and HIV (Sellers 2012:190). Screening for these diseases therefore is beneficial in the promotion of preterm birth reduction since infections such as syphilis, Hepatitis B, and HIV are associated with preterm birth (March of Dimes et al 2012:20). In this study, the researcher used the timing of ANC initiation, the occurrence and timing of the above named interventions together with the number of ANC visits to rate ANC adequacy.

Outcomes of medical care: Studies by Beeckman et al (2012a:366) and Krueger and Scholl (2000:485) showed that women who received inadequate antenatal care had higher odds of delivering prematurely as compared to those who received adequate care. The main purpose of this study was to investigate the relationship between ANC adequacy and preterm births. This is detailed in the results and discussion sections.

1.8 RESEARCH DESIGN AND METHOD

The researcher used a quantitative, descriptive, correlational, retrospective, case control design. In this study, cases are women aged 18 years and above with preterm new-borns and controls are women in the same age group with term new-borns. The study setting was one state referral hospital in Windhoek. This is a referral hospital and though it has a higher number of pregnant women coming from and around Windhoek, it has women referred from all parts of Namibia. The number of babies born alive at this hospital per month is about 250 (Cullinan 2010:4) and 14.4% of all live births in Namibia are preterm (WHO 2012:1). The outcome of interest is premature birth and exposure is ANC adequacy. The target population was represented by all women aged 18 and above who have given birth to live babies in Namibia, whilst the accessible population was represented by all women who gave birth to live babies during the 3 month period of data collection at an identified state referral hospital in Windhoek. Therefore the accessible population was made up of approximately 750 women. The researcher used

antenatal care records of women who had delivered either a preterm or a term new-born during the period March 2015 to June 2015 as the sampling frame. The ANC cards do not have information relating to the level of education and history on previous admission of a neonate; hence responses pertaining to these 2 items were elicited from the women. In Namibia, the antenatal care record remains in the possession of the women throughout pregnancy and after delivery. The researcher regarded this record as ideal as it contained most of the information needed. Sampling and data collection occurred whilst the women were still in hospital after giving birth as this made access to the ANC records more feasible. Permission to use the antenatal care records was sought from the selected women. The women were also informed and they consented to being asked about the level of education and, where applicable, history on the previous admission of a neonate into hospital.

A statistically calculated sample size of 40 cases and 80 controls was used in a ratio of 1 case to 2 controls. Consecutive sampling was used to sample the cases. Incidence density sampling was used to sample the controls. Cases and controls selected had to meet the eligibility criteria. Sampling and data collection occurred concurrently, meaning that, for example, on a day 2 cases were sampled, 4 controls were sampled and 6 checklists were completed.

The self-report method in the form of a checklist was used to collect data. The checklist was designed in such a way as to capture information on personal and pregnancy related characteristics, and ANC adequacy. Information related to ANC adequacy included; when ANC was initiated, how many ANC visits each woman had and which interventions were received by each woman and when these interventions occurred (see Appendix C).

Data were coded and entered into EPI info. Data analysis was done using Statistical Package for Social Sciences (SPSS) version 20. Personal and pregnancy related characteristics were analysed using descriptive statistics. Odds ratios were used to analyse the relationship between antenatal care adequacy and preterm birth.

1.9 SCOPE AND LIMITATIONS OF THE STUDY

Although the intention was to collect data related to antenatal care adequacy and pregnancy outcome, the association of personal and pregnancy related characteristics with either antenatal care adequacy or pregnancy outcomes or both was also analysed. Data were only collected at one hospital which is based in an urban setting. Generalisation of the findings may thus be biased. Even though minors (below the age of 18) are found to be pregnant in many settings, these were excluded from the study as they are not legally able to give consent for research studies or clinical procedures. Moreover, missing or unclear information could have led to bias. In addition, data collection was over a period of 3 consecutive months and this does not take into consideration seasonal variations in birth rate or health seeking behaviours. If funds and time were not constraints, the researcher could have preferred to use the whole accessible population as the sample, as sampling from a small population reduces the generalisability of the research findings.

1.10 STRUCTURE OF THE DISSERTATION

The structure of the dissertation is presented in Table 1.1 below.

Table 1.1: Structure of the dissertation

Chapter	Title	Summary of content covered
1	Orientation to the study	This chapter introduced the study. Background information on preterm birth and antenatal care was presented. This was followed by a description of the research problem, aim of the study, significance and definitions of terms. The theoretical foundations of the study were then discussed, followed by a description of the research design and method, and an outline of the scope and limitations of the study.
2	Literature review	Literature review contributes to the existing body of knowledge and serves to improve the life world of people. Literature from research articles, books and publications on antenatal care adequacy and preterm birth (worldwide, in and around Africa and in Namibia) was reviewed and presented in this section.
3	Research design and method	In this chapter a detailed description of the research design and method was done. This included sampling, data collection and analysis. Under data collection a

		discussion on ethical considerations as well as a description of data analysis was presented. The researcher concluded this chapter by discussing issues pertaining to the internal and external validity of the study.
4	Analysis, presentation and description of the research findings	This section detailed data management and analysis. Sample characteristics were analysed in relation to personal and pregnancy related characteristics. An analysis was done to describe the association between antenatal care adequacy and preterm birth. An overview of research findings was presented in conclusion.
5	Conclusions and recommendations	This chapter basically summarised the whole study. Recommendations and contributions of the study were put forth.

1.11 CONCLUSION

In this first chapter, the researcher gave an introduction to the study. The researcher started with an introduction then went on to describe the background to the research problem, the research problem, aim of the study and the significance of the study, and the definition of terms. The researcher also described the theoretical foundations of the study, the research design and method, and the scope and limitations of the study. The researcher concluded the chapter by outlining the structure of the dissertation.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

In this chapter, the findings from the various reviewed literature sources are presented. The researcher starts off by discussing preterm birth, its prevalence, causes and effects. The researcher then goes on to elaborate on the literature relating to antenatal care. Antenatal care (ANC) is defined and literature on ANC coverage, the timing of care, the content of care, factors associated with ANC adequacy and the benefits of ANC is discussed. This is followed by a brief discussion on millennium developmental goals and the prevention of preterm birth. The literature review section ends with a detailed discussion on ANC activities and the prevention of preterm birth.

2.2 PRETERM BIRTH

2.2.1 Preterm birth defined

Preterm birth is birth that occurs after viability but before 37 completed weeks of pregnancy. A foetus is said to be viable at 28 weeks gestation in the developing countries, such as Namibia and, according to the WHO, at 24 weeks gestation or 500 g birth weight in the developed countries (Sellers 2012:278). The WHO (2014:1) defines preterm birth as babies born alive before 37 weeks of gestation with the categories of prematurity being extremely preterm, very preterm and moderate to late preterm when gestational age at birth is less than 28 weeks, between 28 and 32 weeks and between 32 to less than 37 weeks respectively. March of Dimes et al (2012:19) define preterm birth rate as all live and viable births before 37 weeks, regardless of whether the pregnancy is a singleton or multiple, per 100 live births.

2.2.2 Prevalence of preterm birth

Over 60% of preterm births occur in Africa and South Asia. Ten countries with the highest numbers are Brazil, the United States of America, India and Nigeria. In addition, statistics from the National Centre for Health Statistics (2011) show that nearly 12 out of every 100 babies born in 2010 were premature, a sharp rise from 1981 by 30%. Of the 11 countries with preterm birth rates of over 15%, all except 2 are in Sub-Saharan Africa March of Dimes et al (2012:2, 12).

The world has seen a dramatic and worrisome rise in the rate of preterm births in the past two decades (Tedesco et al 2012:1638). According to Raets (2014:11), the incidence of preterm birth is on the rise with Netherlands recording 7.8% preterm deliveries in all deliveries. About 14.4 babies per 100 births were reported to have been born preterm in Namibia in 2010 (WHO 2012:1), placing Namibia on the fifth rank in Southern Africa (see Figure 2.1 on page 17). In 2011, 7310 babies were born prematurely in Namibia and of those 410 died (Hoffman & Hoffman 2015:9). Therefore preterm birth is truly a global problem.

2.2.3 Causes of preterm births

The causes of preterm birth have been attributed to multiple pregnancies, infections and chronic conditions such as diabetes and high blood pressure (WHO 2014:2). March of Dimes et al (2012:20) also cite the causes of preterm birth as infections, underlying maternal conditions, multiple pregnancy, lifestyle or work related issues, medical induction or caesarean birth, age at pregnancy and pregnancy spacing (see Table 2.1 on page 19).

Rouget, lebreton, Kadhel, Monfort, Bodeaum-Livinic Janky, Multigner and Cordier (2013:1107) found a relationship between induced preterm births and gestational hypertension, gestational diabetes and previous preterm births.

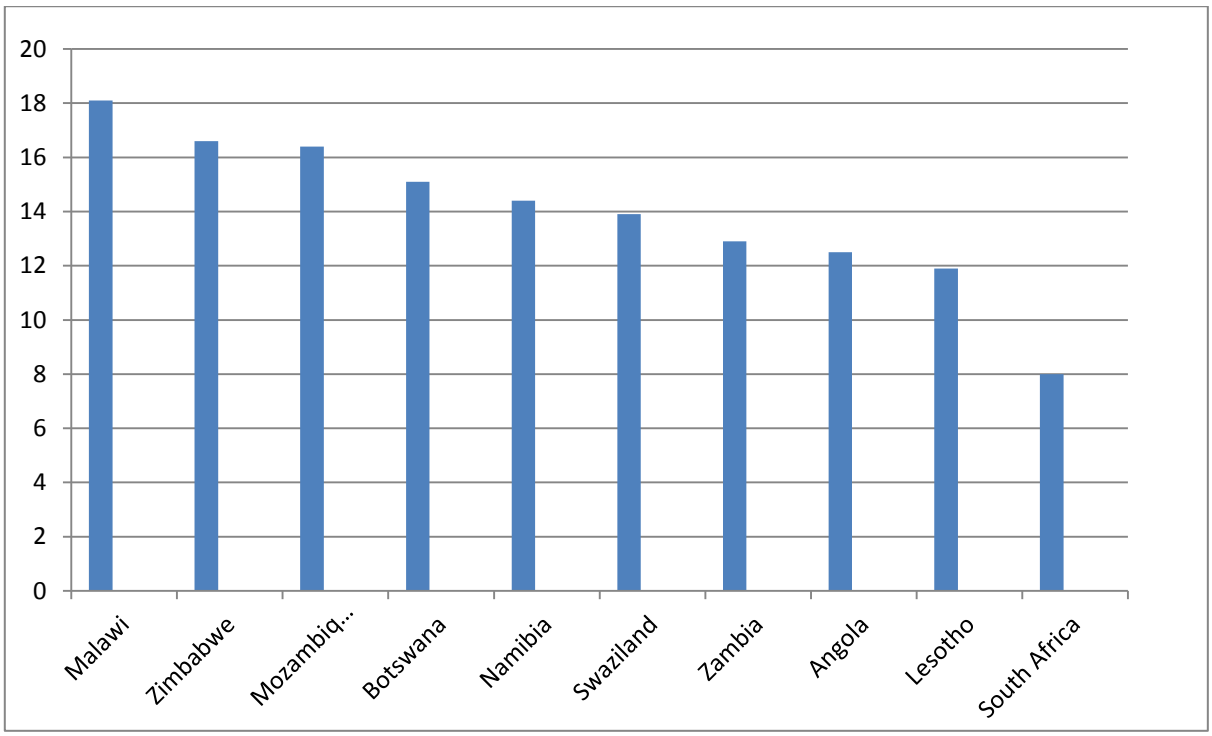

Figure 2.1: Preterm birth rate in Southern African countries

Statistics from: WHO (2012:1-4)

In another study which was focussing on biopsychosocial risk factors for preterm birth and post-partum emotional well-being on Turkish women, it was found that there was a statistically significant difference between term and preterm birth groups in relation to hospitalisation during pregnancy, infection in pregnancy, passive smoking and irregular prenatal visit among other factors (Gungor, Oskay & Beji 2011:657).

On another study on the risk of preterm birth among women with maternal Chlamydia trachomatis, Folger (2014:1795) found the relative risk of preterm birth to be higher in the infected adolescent women and also that the early detection and eradication of Chlamydia trachomatis reduces the risk of preterm birth significantly. In addition to intrauterine infection, preterm birth has been found to be associated with the unavailability of tocolytic medications (Beck et al 2010:35).

In another study in Tanzania by Watson-Jones, Weiss, Changalucha, Todd, Gumadoka, Bulmer, Balia, Ross, Mugeye and Hayes (2007:11), a 12 % preterm risk rate among pregnant women was found and there was a relationship between prematurity and social factors such as younger age, occupation, marital status and snuff use. Untreated

bacterial vaginosis and maternal malaria were also found to be some of the causes of preterm birth in addition to anaemia in pregnancy. Tedesco et al (2012:1639) also state that preterm birth has been linked to dysfunctional social systems and has been seen as a serious public health issue of concern.

In as much as the literature reviewed points out to some of the likely causes of preterm birth, preterm birth has remained a global problem because it is not yet absolutely clear what the causes are. More research is needed in this area.

2.2.4 Effects of preterm birth

Lawn (2009) is cited as stating that “one important barrier to progress on millennium developmental goal (MDG) 4 has been the failure to reduce neonatal deaths and deaths from its single most important cause-prematurity” (March of Dimes et al 2012:10). Prematurity is the leading cause of death in new-borns and the second leading cause of death in the under 5’s (March of Dimes et al 2012:1). Addressing the problem of preterm birth in low-income countries, may, in addition to improving maternal health, contribute to the achievement of MDG 4, which is to reduce child mortality by two-thirds by the end of the year 2015.

Preterm birth is ranked as the world’s largest killer of new-born babies, causing more than 1 million deaths each year (March of Dimes et al 2012:2). Kabeera (2014:1) reported that according to research worldwide, direct complications from preterm birth were responsible for 965 000 deaths within the first 28 days of life and for about 125 000 deaths between the ages of one month and five years of life. Furthermore, Blencowe et al (2013:2) stated that of the 3.1 million neonatal deaths worldwide, 1.08 million (35%), were caused by preterm birth complications (see Figure 2.2 on page 20).

Table 2.1: Causes of preterm birth

Type	Risk factor	Examples
Spontaneous preterm	Age at pregnancy and pregnancy spacing	Adolescent pregnancy, advanced maternal age and short inter-pregnancy interval
	Infection	Urinary tract infection, HIV, syphilis, bacterial vaginosis
	Underlying chronic medical conditions	Diabetes mellitus, hypertension, anaemia, asthma, thyroid disease
	Lifestyle / work related	Smoking, excess alcohol consumption, recreational drug use, excess physical work/activity
Provider initiated preterm birth	Medical induction or caesarean birth for obstetric indication or foetal indication Other: not medically indicated	In pregnancy complications such as placental abnormalities or maternal conditions such as pre-eclampsia/eclampsia

Adapted from March of Dimes et al (2012:20)

According to Beck et al (2010:31), preterm birth has been found to be associated with increased rates of cerebral palsy, sensory impairment and learning difficulties, as well as respiratory insults. These negative effects have also been seen to affect the later life of the child, causing psychological, physical and financial burdens. Aarnoudse-Moens (2012:11) also postulates that even though perinatal care has improved, developmental outcomes of infants born too soon remain of concern since immature organs, such as the brain and lungs, are affected, indeed to a large extent by the adverse consequences of very preterm birth. Undesirable developmental outcomes linked to preterm birth include respiratory illnesses, abnormal growth patterns and also severe neurosensory disabilities such as cerebral palsy, mental retardation, and deafness or blindness. The author further states that the majority of very preterm children that survive without obvious neurosensory disabilities and with normal intelligence will likely suffer from long-term problems which include fine and gross motor dysfunction, neurocognitive dysfunction such as impaired visual-spatial and language skills among other learning problems. Raets (2014:11) states that prematurity is associated with preterm brain injury which results in cognition, attention, and behaviour problems in 25−50% and major motor problems in 5−10% of the preterm births.

Gungor et al (2011:655) cite Damus (2008), as stating that preterm birth has serious effects on the mother, child, and society, which makes preterm birth an important issue to public health worldwide.

Even though the causes of preterm birth still remain unclear, its effects are profound. Indeed much research is needed to identify and modify any factors, behaviours or practices that may have an association with preterm birth.

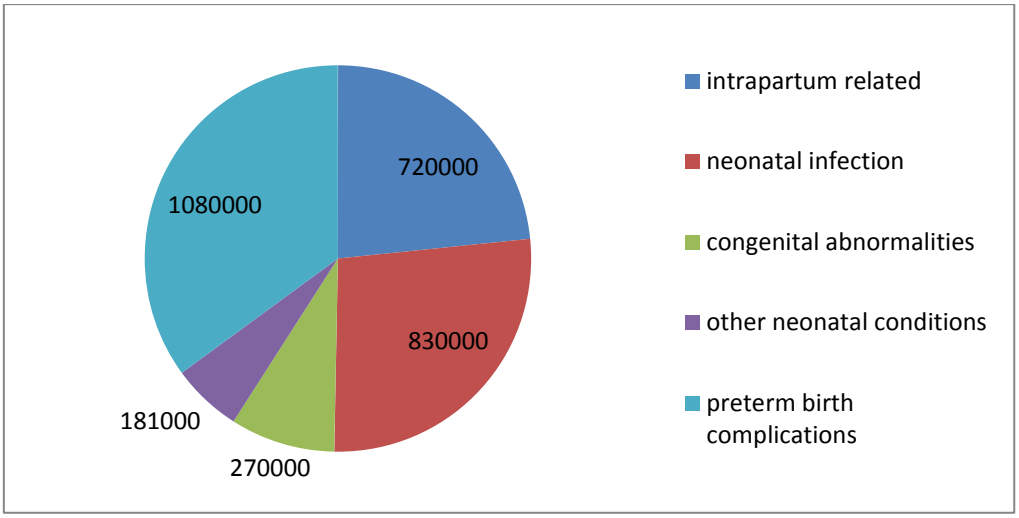

Figure 2.2: Estimated distribution of causes of 3.1 million neonatal deaths in 193 countries

Statistics from: Blencowe et al (2013:2)

2.3 ANTENATAL CARE ADEQUACY

2.3.1 Antenatal care and antenatal care adequacy defined

Antenatal care is the use of a scientific nursing process by the midwife to assess and plan care for each pregnant woman on an individual basis (Sellers 2012:172). Marshall and Raynor (2014:179) put it as care given to a pregnant woman from the time of conception till the time labour commences. Tayebi, Hamzehgardeshi, Shirvani, Dayhimi, and Danesh (2014:131), define prenatal/antenatal care as the maintenance of healthy pregnancy outcomes through the accurate and consistent observation of the principles which are important in maternal and child health.

Customary ANC classifies pregnant women into low risk and high risk and involves many ANC visits. The National Institute for Health and Care Excellence (NICE) guidelines (2014:14) support the customary approach and state that for a woman who is low risk and nulliparous, the ANC visits should be around 10; whereas for a low risk multiparous, ANC visits should be around 7. According to Lincetto et al (2006:53, 55), the high risk approach has flaws, however, since many women are found to develop at least one risk factor and those classified as low risk may still develop complications. The authors go on to state that in the alternative approach, focused antenatal care (FANC), goal oriented ANC services are provided through the use of evidence-based interventions implemented at the times deemed to be critical in pregnancy. These critical times are; first visit at 8−12 weeks gestation, second visit at 24−36 weeks gestation, third visit at 32 weeks and fourth visit at 36−38 weeks. The customary approach emphasises on the number of ANC visits (quantity) whilst the later approach acknowledges the importance of quality of care. In Namibia, the Ministry of Health and Social Services (MoHSS) started the training of health care providers on FANC in 2013 and also issued out a circular encouraging the uptake of this programme (MoHSS 2013:1, 2). The researcher realised that even though midwives agreed that FANC is effective as it enables quality care, the implementation still needs to scale up.

According to Beeckman et al (2012a:366, 367), ANC adequacy can be measured with both the APNCU and CTP tool. The APNCU tool takes into consideration the timing of initiation of ANC and the total number of visits per women adjusted according to the gestational age. The CTP tool looks at the minimum package which is recommended for every pregnant woman. Timing of initiation of care, the total number of interventions and when exactly the interventions occurred are considered in the CTP tool. Beeckman, Louckx, Masuy-Stroobant, Downe and Putman (2011:1) state that, however, other studies have shown that there is no association between fewer ANC visits and pregnancy outcome. With increased uptake of FANC, there may be a need to modify the APNCU and CTP tools for measuring ANC adequacy.

2.3.2 Timing of antenatal care as a measure of adequacy

2.3.2.1 Globally

According to the United Nations International Children's Emergency Fund (UNICEF 2015:1), only about half of pregnant women receive the minimum amount of care in terms of the number of ANC visits (that is, four visits per pregnancy), worldwide. The WHO (2015:2) states that about 83% of women received ANC at least once during pregnancy worldwide between 2007 and 2014. The proportion of women who received a minimum of four antenatal visits was, however, only 64%.

In South Asia, 71 % of pregnant women were found to have attended at least one ANC visit with a skilled birth attendant; whereas for East Asia, the Pacific and Latin America, and the Caribbean, the coverage was reported to be above 90%. Figure 2.3 (on page 24) shows that in Sub Saharan Africa, ANC attendance for a single visit is around 76% and only 45% for four visits (UNICEF 2015:1). Joshi, Torvaldsen, Hodgson and Hayen (2014:4), in a study in Nepal, found that half of the women had at least four ANC visits and the other half had fewer than four, of which 15% had none.

In their study in Shanghai, Zhao et al (2012:4) concluded that the proportion of women who never made an ANC visit was 9.9%, while 90.1% had at least one ANC visit. 49.7% of the women were described as having adequate ANC, which was defined as at least four ANC visits during pregnancy.

Sivaganesh and Senarath (2009:515), from a study done in Sri Lanka, state that the proportion of women registered for ANC within the first 12 weeks was 31.4% only.

2.3.2.2 In Africa

According to Zhao et al (2012:2), studies have shown that the initiation of ANC within the first trimester does reduce unfavourable pregnancy outcomes. This is so because women who have their first ANC visit in the first trimester are more likely to get timely information on all the antenatal screening tests obtainable as compared to those who start ANC after the first trimester.

In a study by Gross, Alba, Glass, Schellenberg and Obrist (2012:4) in Tanzania, most women initiated ANC late, with only 29% initiating ANC within the first four months of pregnancy.

Bbaale (2011:436), in a study of factors influencing the timing and frequency of ANC in Uganda, found that 17% pregnant women initiated ANC in the first trimester and only 47% attained at least four antenatal visits.

Hoque, Hoque and Kader (2008:66c) also concluded from their study in South Africa that only 9% pregnant women attended ANC in the first trimester. However the mean number of ANC visits was reported to be six, exceeding the four visits recommended by the WHO. However, the same cannot be said for most southern African countries.

Lincetto et al (2006:51) state that ANC is a success in Africa since about 69% of pregnant women have at least one ANC visit. The authors state that there is, however, need to achieve four visits and ensure the provision of evidence based interventions.

In the Zambian Demographic Health Survey of 2007, 98% of the mothers attended ANC at least once but only 60% had the recommended four visits. Furthermore, only 19% of the mothers had their first ANC visit in the first trimester and 74% attended ANC for the first time in the second trimester (Kyei, Chansa & Gabrysch 2012:7).

2.3.3.3 In Namibia

The 2006 and 2007 Namibia Demographic Health Survey (MoHSS and Macro International Incorporated. 2008:118, 119), states that “Antenatal care is more beneficial in preventing adverse pregnancy outcomes when it is sought early in the pregnancy and is continued through to delivery. Health professionals recommend that the first antenatal care visit should occur within the first three months of pregnancy and continue on a monthly basis through the twenty-eighth week of pregnancy and every two weeks up to the thirty-sixth week (or until birth)”. This will inadvertently result in more than four antenatal visits per uncomplicated pregnancy, as is recommended by the WHO. Where complications are detected more frequent visits should be scheduled.

It is also stated in the Namibia Demographic Health Survey (MoHSS and Macro International Incorporated 2008:19) that 95% of pregnant women received ANC at least once, whilst 70% attended ANC at least four times during their pregnancy and more than 60% initiated ANC after the first trimester. This is a marked improvement from the National policy for reproductive health report (MoHSS 2001:5), which put the proportion of pregnant women who received ANC at 87%. In the 2013 Namibia Demographic Health Survey (MoHSS, National Statistics Agency & National Institute of Pathology 2014:13), the proportion of women who received ANC at least once rose slightly to 97% in 2013 (see figure 2.4 on page 25).

Less than 7% of the pregnant women in the Khomas region of Namibia receive ANC check-up during the first trimester and about 40% present in the third trimester. The Khomas region has the highest population in Namibia when compared with the other 12 regions, yet it has the poorest utilisation of antenatal care services (McLaughlin et al 2010:104) (see figure 2.5 on page 25).

Even though more pregnant women are found to have attended ANC at least once during pregnancy, fewer women visit the ANC at least four times during their pregnancy. It is imperative that such a situation should be reversed in order to improve pregnancy outcomes. More needs to be done to ensure that a much higher proportion of women do achieve at least 4 ANC visits by the time they give birth.

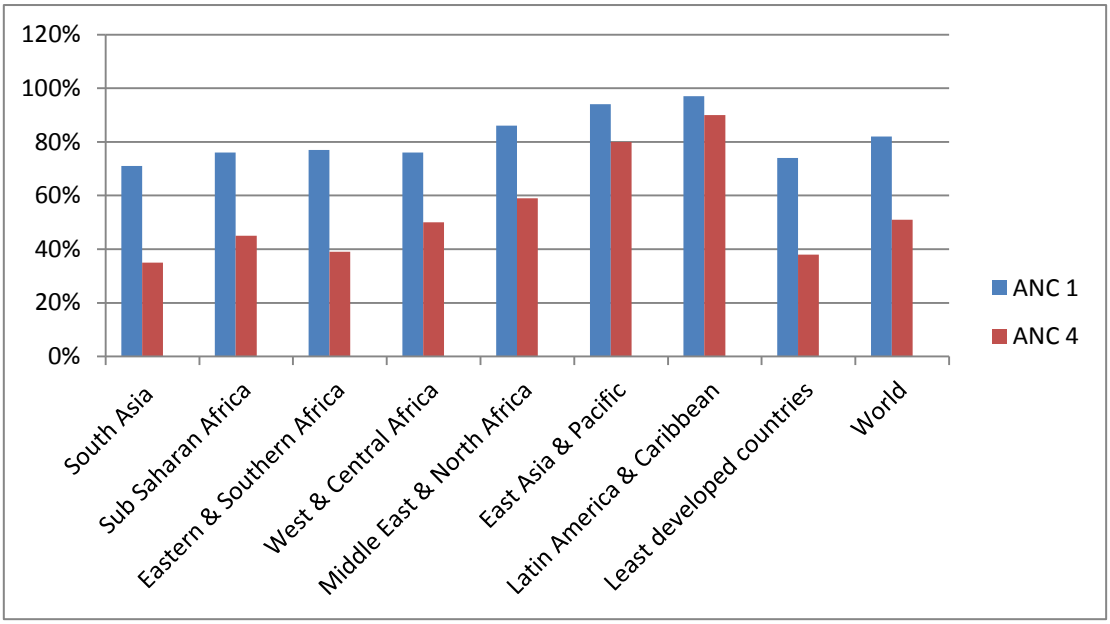

Figure 2.3: Antenatal care attendance: 1 visit and 4 visits

Data from UNICEF (2015:1)

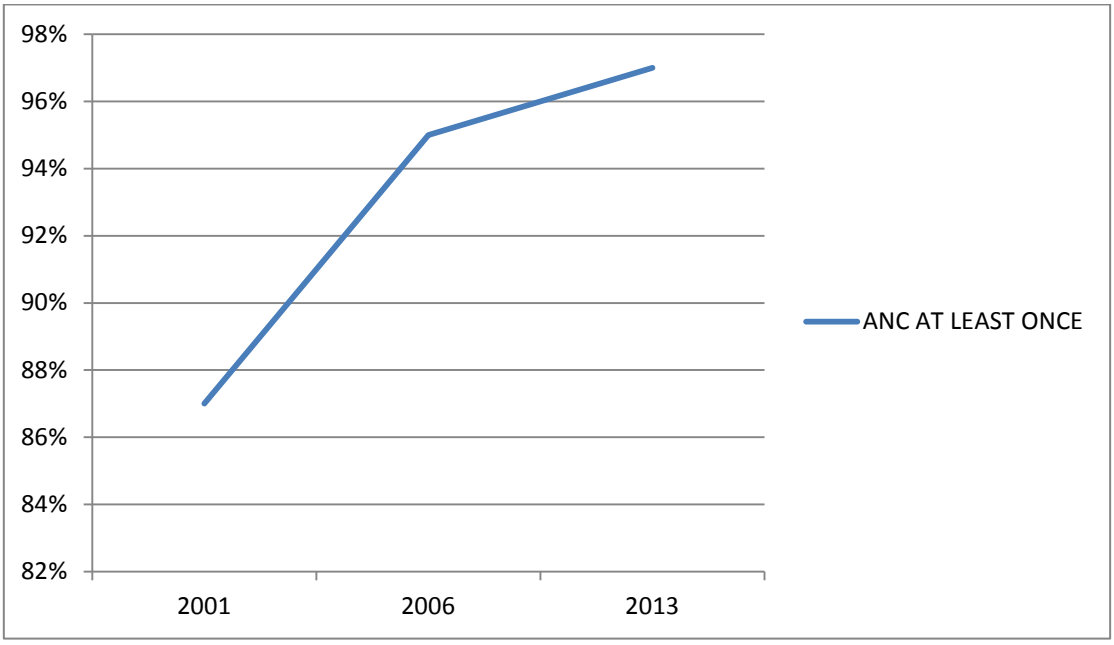

Figure 2.4: Antenatal care in Namibia: 2001, 2006 and 2013

Data from MoHSS (2001:5), MoHSS and Macro International Incorporated (2008:19) and MoHSS, National Statistics Agency and National Institute of Pathology (2014:13)

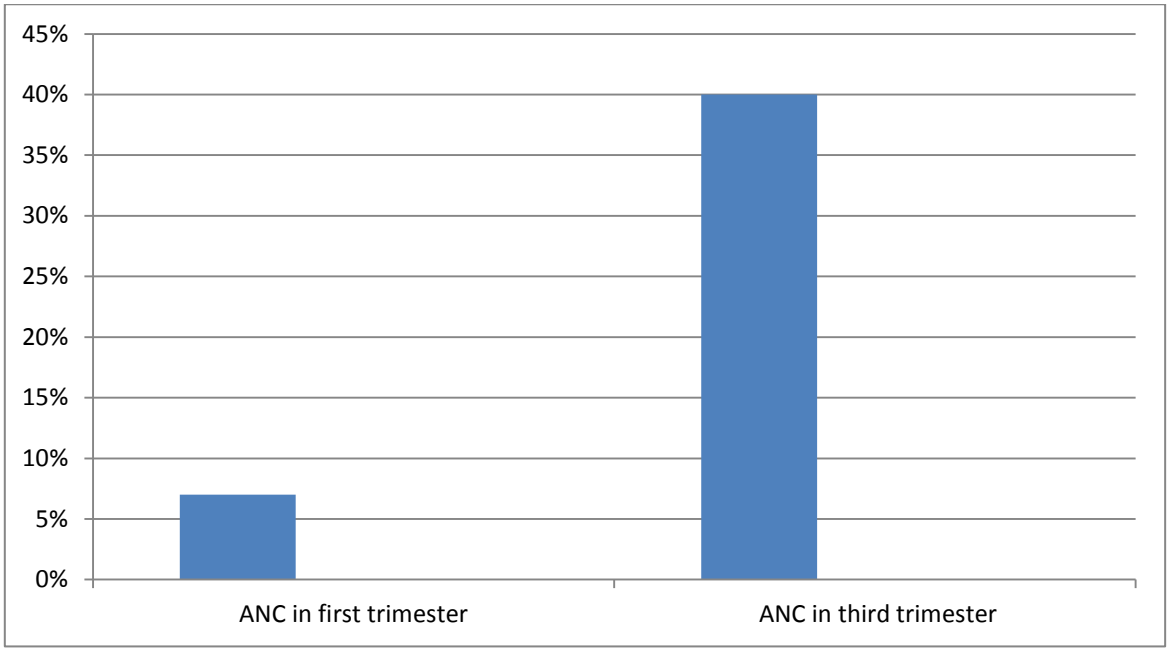

Figure 2.5: Initial antenatal care visit in the Khomas region

Data from McLaughlin et al (2010:104)

2.3.3 Factors associated with antenatal timing of care

2.3.3.1 Intrapersonal factors

Banda et al (2012:34) state that women of high parity and gravidity have a tendency of initiating ANC late. This can be attributed to limited resources in the family and negative perceptions resulting from previous pregnancy experiences. The authors also postulate that there is a possibility that multiparous women feel more confident after previous experience and may regard starting ANC early as unnecessary.

Tran, Gottvall, Nguyen, Ascher and Petzold (2012:8) found that multiparous women reported for ANC late in their study on factors associated with ANC adequacy in rural and urban contexts in Vietnam, though this did not have an influence on receiving ANC services. According to Zhao et al (2012:6), past obstetric history, age, educational level and household income were found to have an association with the adequate utilisation of ANC.

More educated women, women who participated in household decision making and rich women were found to have higher odds of receiving four or more visits as compared to the less educated women, women who did not participate in decision making and poor women respectively. On the other hand, women of higher parity had lower odds of receiving four or more visits (Joshi et al 2014:4).

In the 2000 NDHS (MoHSS 2003:17), it was reported that in Namibia among the uneducated women, the proportion that did not receive ANC at all was more than one in five women, and 99% of the educated women did receive ANC.

2.3.3.2 Institutional hindrances

In a study by Banda et al (2012:34), the unavailability and inaccessibility of health facilities had a negative effect on ANC attendance, especially for women based in the rural areas. Travelling time due to long distances also affected the timing of antenatal care attendance. Additionally, long waiting time before being served at the ANC facilities also resulted in the delay in initiating ANC. Elsewhere, Mametja (2009:33, 34) stated that in addition to the inaccessibility of health services, the undesirable attitude of health

workers, lack of transport, indirect costs such as time off work, inability to get appointment in time, long waiting periods and unsuitable clinic operating times were a hindrance to the early initiation of ANC. Joshi et al (2014:6) also state that women who received care at a non-government hospital had greater odds of receiving good quality ANC as compared to those who attended ANC at a government hospital.

In the rural areas of Namibia, the accessibility of ANC services is hampered by long distances that the women have to walk as many cannot afford transport. More than 60% of the rural people in Namibia live at least five kilometres from the nearest health care facility (McLaughlin et al 2010:107).

2.3.3.3 Community hindrances

Women who perceived themselves as not having any medical problems, those who were ignorant about pregnancy and those who felt that early initiation of ANC had no benefits were found to initiate ANC late (Mametja 2009:28). According to Banda et al (2012:35), the value attached to ANC attendance was less in rural communities, hence it was typical of women in the rural areas to attend ANC late. The author also asserts that in urban areas, late ANC attendance was found to be linked to some cultural beliefs such as the culture of limiting mobility in pregnant women. In Namibia, the lack of awareness about the importance of ANC was found to be one of the barriers to seeking ANC care among pregnant women (McLaughlin et al 2010:111).

2.3.4 Antenatal content of care

The screening for and management of obstetric complications, sexually transmitted infections including HIV, provision of malaria chemoprophylaxis and tetanus toxoid immunisation form a package of the essential interventions in ANC (Lincetto et al 2006:51).

2.3.4.1 Globally

According to Hodgins and D'Agostino (2014:177), the number of ANC visits cannot be ignored when assessing the quality of ANC as more visits mean more opportunities for interventions and fewer visits may lead to missed opportunities. However, the content of

care is of more importance. In their study, the authors state that globally, for more than 33% of the countries, the proportion of women who reported receiving at least 8 interventions was zero. Only 4 countries had a proportion of 20% of women receiving at least 8 interventions, whilst for most of the countries, Namibia included, less than 5% of the women received at least 8 interventions. The aforesaid interventions are; 4 or more ANC visits, first ANC visit before 4 months gestation, blood pressure, and health education on pregnancy danger signs, HIV counselling and testing, iron-folic acid supplementation for 90 days and more days, at least 2 doses of sulfadoxine/ pyramethamine for malaria prevention, tetanus toxoid immunisation and urinalysis.

2.3.4.2 In Africa

During pregnancy, healthy behaviours and parental skills are promoted. This results in better care during pregnancy and contributes to good health (Lincetto et al 2006:52). March of Dimes et al (2012:47) cite Iams et al (2008), as stating that the risk of preterm birth is reduced in women who receive ANC services.

The 2006 Ugandan Demographic Health Survey (Uganda Bureau of Statistics and Macro International Incorporated 2007:121) reported that the provision of quality ANC services is inadequate, with only 35% of the women having received information on risk factors and danger signs in pregnancy and blood samples having been withdrawn from only 28% of the women. In a study by Zhao et al (2012:7) in Nepal, half of the women were found to have had at least 4 ANC visits but only 24% received good quality ANC.

Kyei et al (2012:3, 7), define good quality ANC as having received at least 8 ANC interventions in addition to having 4 ANC visits with a skilled attendant. Moderate quality ANC was defined as 4 ANC visits with a skilled attendant combined with five to seven ANC interventions. The authors found that only 29% had received good quality ANC and 24% had received moderate ANC.

2.3.4.3 In Namibia

In the Namibian Health Facility Survey, the MoHSS and ICF Macro (2010:10-12) state that most health facilities in Namibia have the necessary resources for the provision of basic ANC services which enable health care workers to manage routine pregnancy

monitoring activities well. However, the health care workers were found to be lacking in vigilance when it came to dealing with complications of pregnancy as only half of the women interviewed verbalised that they had been educated on the danger signs in pregnancy.

Blood pressure and laboratory screening are some of the interventions that are useful in detecting risks in pregnancy, which can lead to adverse pregnancy outcomes such as preterm birth. In the NDHS of 2006 and 2007, the MoHSS and Macro International Incorporated (2008:120, 121), report that 97% of the mothers had blood pressure monitoring done during pregnancy and the same percentage had their blood samples taken. Urinalysis was conducted in 94% of the mothers.

2.3.5 Factors affecting the content of antenatal care

2.3.5.1 Intrapersonal factors

The educational level, the economic status and place of residence were found to be some of the factors which affect the quality of ANC received. Women with some form of education, wealthy women and women residing in the urban setups were found to be better informed about pregnancy complications as compared to those with no education, are poor and reside in rural areas (MoHSS and Macro International Incorporated 2008:120, 121).

According to Joshi et al (2014:9), studies show that more educated women and women from higher income households tend to receive a better quality of ANC. The authors attributed this to the affordability and accessibility of health information to women with higher socioeconomic status as compared to those in the lower socioeconomic status.

2.3.5.2 Institutional hindrances

In Ghana, the Community Health Planning and Services (CHPS) programme was adopted so as to provide door to door health service delivery to the less privileged rural areas of Ghana. Some of the services provided under this package included the giving of health education on pregnancy danger signs, blood pressure and weight monitoring. Women under this programme received better quality ANC as compared to those not in

the programme (Naariyong, Poudel, Rahman, Yasuoka, Otsuka & Jimba 2011:1710). This goes on to show that distance from the health facility has an influence on the quality of ANC received in terms of content of care.

2.3.6 Ultrasound scan, blood pressure measurement and blood sampling as measures of care

Ultrasound scan: Belizán and Cafferata (2011:2) postulate that even though routine ultrasound scan was associated with increased chances of detecting multiple pregnancy and early detection of foetal abnormalities, it hardly appeared to be associated with the reduction of adverse pregnancy outcomes. It is, however, associated with the reduction of labour induction following misdiagnosed post-term pregnancy. Since induction of labour before term is one of the causes of preterm birth, this can probably to some extent reduce preterm births.

Bricker, Medley and Pratt (2015:2) state that even though ultrasound scans may lead to improved pregnancy outcomes through the early detection and management of problems in pregnancy, routine ultrasound scans may just increase the number of interventions without a significant benefit to the mother and the baby.

According to the NICE guidelines (NICE 2014:14), pregnant women need an early ultrasound scan between 10 weeks and 13 weeks 6 days so as to determine the gestational age accurately in addition to diagnosing multiple pregnancies.

Blood pressure: At each ANC visit, blood pressure measurement and urinalysis, to check for proteinuria, should be done to screen for preeclampsia (NICE 2014:31). Pre-eclampsia is one of the reasons why pregnant women either end up having induction of labour before term, or going into premature labour. ANC is therefore essential for the diagnosis of pre-eclampsia/eclampsia and the initiation of the management of these two conditions should they be identified (Sellers 2012:243).

Blood sampling: Routine blood tests in ANC include haemoglobin (Hb) check, rapid plasmin reagent for syphilis, ABO grouping, Rhesus factor, Hepatitis B and HIV (Sellers 2012:190). Infections in pregnancy such as syphilis, Hepatitis, HIV and other STIs have been found to be associated with preterm birth (March of Dimes et al 2012:20).

Screening for these diseases therefore is beneficial in the promotion of preterm birth reduction. According to NICE guidelines (NICE 2014:29, 38), it is essential to offer syphilis screening to all women in early pregnancy as this has benefits to both the mother and baby. In the same guidelines it is stated that although Chlamydia is significant especially among the young, there is not much evidence to support recommendations for routinely screening for it. However, it has been found that there is a possibility that the treatment for Chlamydia might decrease the rate of preterm birth.

2.3.7 Benefits of antenatal care

ANC allows for birth preparedness including readiness to deal with complications. It also enables the early detection and treatment of diseases either arising in pregnancy or pre-existing.

It is during pregnancy and child birth that an opportunity arises for the provision of functional interventions to reduce perinatal mortality as well as preterm birth (March of Dimes et al 2012:47).

Joshi et al (2014:2) cite Pattinson (2004), Tuladhar and Dhakal (2011), Yakkob et al (2009) and Goldani et al (2004), as stating that good quality ANC has a positive effect on maternal health as it decreases the chances of suffering from anaemia, pregnancy induced hypertension and preterm labour and it also reduces the chances of giving birth to a low birth weight or a preterm baby.

Banda (2013:8) cites WHO and UNICEF (2003) as stating that ANC has a contributory effect to the promotion of good pregnancy outcomes and that usually the benefits of ANC are directly linked to the timing and quality of care provided.

ANC provides an ideal platform to educate women on family planning, nutrition, danger signs during pregnancy, labour and the post delivery period. Women are also educated on the importance of being attended to by a skilled birth attendant at delivery. All these actions have the ultimate advantage of reducing maternal morbidity and mortality as well as perinatal mortality and adverse pregnancy outcomes.

2.4 MILLENNIUM DEVELOPMENTAL GOALS AND THE PREVENTION OF PRETERM BIRTH

The United Nations (UN) Millennium Development Goals (MDGs) are 8 goals that the Member States of the UN have committed themselves to try and attain by 2015. The commitments include: combating poverty, hunger, disease, illiteracy, environmental degradation, and discrimination against women (WHO 2015:1). According to March of Dimes et al (2012:10), these goals put reproductive, maternal, new-born and child health (RMNCH) in the spotlight both socially and politically. This has by and large benefited the developing countries as they have seen an improvement in public health since the establishment of the goals. Addressing some of the MDGs will result in actions that may prevent preterm birth (Table 2.2).

Table 2.2: Millennium developmental goals and the prevention of preterm birth

Millennium developmental goal	Link to prevention of preterm birth
1. Eradicate extreme poverty and hunger	• Women who can afford a good diet are less likely to give birth prematurely • Women who are financially comfortable tend to initiate ANC early and this aids in the reduction of preterm birth
2. Achieve universal primary education	• Educated young girls are likely not to fall pregnant in adolescence; adolescent pregnancy is a risk factor for preterm birth
3. Promote gender equality and empower women	• Empowered women are more likely to have good health seeking behaviours such as attending ANC early which is linked to a reduction of preterm birth
5. Improve maternal health	• Family planning services are key to the reduction of adolescent pregnancy and they ensure adequate child spacing. This reduces the risk of preterm birth
6. Combat HIV / AIDS, malaria and other diseases	• Treatment of these diseases before conception and during the antenatal period will reduce the risk of preterm birth
7. Ensure environmental sustainability	• When women utilise safe water and good sanitation facilities, infectious disease transmission is reduced and this reduces infections in pregnancy and ultimately preterm birth
8. A global partnership for development	• Constituencies can mobilise resources to support reproductive health and the prevention of preterm birth

Adapted from March of Dimes et al (2012:10)

2.5 ANTENATAL CARE ACTIVITIES AND PRETERM BIRTH REDUCTION

ANC provides an entry point for interventions which give health workers the opportunity to detect risky conditions in pregnant women and therefore refer them for early management leading to better pregnancy outcomes such as term births (Ajibade et al 2013:190). Through prevention, screening and management of sexually transmitted diseases such as HIV and syphilis, promoting healthy nutrition and addressing lifestyle risks, ANC can aid reduce preterm birth rates.

Interventions for the prevention of preterm birth can be classified into pre-pregnancy care package, ANC packages and provider education. The pre-pregnancy care package includes family planning, education and nutrition for girls and the prevention of sexually transmitted diseases. The ANC package includes screening for and management of STIs, high blood pressure, and diabetes. It also includes the promotion of behaviour change for lifestyle risks and the provision of specific care to pregnant women identified to be at increased risk of preterm birth. On the other hand, provider education focuses on the promotion of appropriate induction of labour and caesarean section (March of Dimes et al 2012:6).

A study done by Beeckman et al (2012a:366) found a significant association between content and timing of ANC and preterm birth when the CTP tool was used. The researchers found that the unadjusted odds ratio for preterm birth was about 4 times less for women in the appropriate group compared with the inadequate group, and when controlling for confounders, the association became even more pronounced. The WHO recommends 4 ANC visits as a minimum. However, a study by Beeckman et al (2012a:366) showed that quantity alone is not enough to reduce pregnancy complications such as preterm birth; rather quality should be combined with quantity. Unfortunately the quality of ANC throughout Sub Saharan Africa is negatively affected by resources (human and material) among other factors.

Krueger and Scholl (2000:485), in a study on the adequacy of prenatal (antenatal) care and pregnancy outcomes found that when the Kessner (Adequacy of Prenatal Care) index was applied, women who received inadequate care had a 2.8% greater risk of giving birth prematurely. When the Kotelchuck (Adequacy of Prenatal Care Utilisation)

index was used, the risk was 2.1%. Inadequate ANC was therefore found to be linked to preterm birth.

According to Tetui, Ekirapa, Bua, Mutebi, Tweheyo and Waiswa (2012:8), information from the Uganda demographic and health survey of 2006 showed that the provision of a full package of ANC was insufficient. The authors cite Sarker et al (2010) as stating that ANC is of utmost importance in the recognition of danger signs in pregnancy, which in turn leads to appropriate action. In the same article, Carroli, Rooney and Villar (2001) are cited as saying that the depth of information during ANC and counselling is important in helping the women to be in a position to identify danger signs. Some of the dangers signs include those that may herald preterm delivery. These include severe abdominal pain, vaginal bleeding and draining of liquor (Tetui et al 2012:2).

A study done by Hoque et al (2008:66c) looked at the specific components of ANC which included pregnancy history, examination, screening and prophylaxis and it was found that there was no consistency in the provision of such activities. These components are crucial as they are basic measures in evaluating a pregnant woman's health. Such an evaluation may help shed light on complications that may affect the mother or lead to adverse birth outcomes.

In a study by Kyei et al (2012:7), 29% of mothers were found to have good quality ANC, and 24% had moderate quality ANC. Of those who received good quality ANC, only 8% attended in the first trimester. Good quality ANC was defined as having attended at least four ANC visits with a skilled birth attendant and having received at least eight antenatal interventions, while moderate quality ANC was defined as having had four visits with a skilled attendant and five to seven antenatal interventions. These findings indicate that only a minority of women receive good quality ANC and that most women initiate ANC after the first trimester. It would be desirable to have more women receiving good quality ANC and also initiating ANC early so as accentuate the efforts of reducing preterm birth.

ANC involves screening for health and socio-economic conditions likely to increase the possibility of specific adverse pregnancy outcomes, providing therapeutic interventions known to be effective and educating pregnant women about planning for safe birth, emergencies during pregnancy and how to deal with them. A typical ANC package

includes history taking, clinical examination, running of essential tests including HIV, counselling on birth preparation, administration of tetanus toxoid and other essential supplements (Tetui et al 2012:2). Some of the activities under this package such as clinical examination and the running of essential tests may help in the identification of risks for preterm delivery so as to inform decisions on mapping interventions targeted at reducing preterm delivery.

Some of the interventions that can benefit women at risk of preterm births include the insertion of the shirodkar suture for those with short cervixes and progesterone supplementation. These interventions were actually among the 5 interventions found to reduce the preterm birth rate from 9.6% to 9.1% in developed countries (Rochman 2012:1). Such interventions are only accessible during ANC to those women who attend ANC early and consistently. Regular ANC is crucial as it enables the health care provider to monitor the health of the woman and that of the baby. During such visits women should be encouraged to mention any signs or symptoms of concern no matter how trivial they may seem.

The prevention of viable spontaneous preterm birth through screening is one of the key aims of ANC as these births have implications for the child, the mother and the society. If women can be identified to be at high risk of spontaneous preterm birth in early pregnancy, they can be targeted for more intensive ANC surveillance and prophylactic interventions (Honest, Forbes, Duree, Norman, Duffy, Tsourapas, Roberts, Barton, Jowett, Hyde & Khan 2009:3).

Bollini and Quack-Lotscher (2013:1061) point out that pregnancy is a delicate period and as such, screening, interventions and follow up should follow a specific timing. Gungor et al (2011:656) cite Damus (2008) as stating that interventions can be tailored to include routine assessment of common and modifiable risk factors known to be associated with preterm deliveries.

A study conducted by Ii, Suquist and Sundquist (2013:1056) on immigrants from central Africa and Asia, and preterm births in Sweden showed that these women had an increased risk of preterm birth and this risk was linked to the substandard quality of ANC in addition to sociocultural differences in pregnancy strategies, delay in seeking health care, shortage of medication and ineffective communication.

In a study on predictors of preterm births and low birth weight in an inner city hospital in Sub Saharan Africa, Olusanya and Ofovwe (2010:985) found that most of the risk factors were actually modifiable. These risk factors included (but were not limited to) poor housing, sanitation, lack of ANC and premature rupture of membranes. The authors asserted that improved obstetric care and improved maternal health seeking behaviour could help modify these risks hence reduce preterm birth especially in developing countries.

According to the Centre for Disease Control (2014:2), even if the causes of preterm birth remain an enigma, women can adopt behaviours which help reduce the risk of preterm birth. These behaviours include quitting smoking, avoiding alcohol and habit forming drugs, seeking ANC as early as possible and getting treatment for any warning signs or symptoms of preterm labour.

From the perspective of infant health, the prevention of spontaneous preterm labour is primary prevention; secondary prevention includes measures to reverse the progress of preterm labour, whilst tertiary prevention is aimed at addressing complications associated with preterm birth. Primary prevention activities include such activities as ensuring a healthy genitourinary system, whereas secondary prevention involves the administration of tocolytics and tertiary prevention the administration of corticosteroids to hasten lung maturity in the foetus (Honest et al 2009:2). The focus has, however, largely been on the latter two of these public health strategies. There is need hence to focus on primary prevention, which is preventing preterm birth.

As the causes of preterm birth still remain unclear, more research is needed and Kabeera (2014:1) reports that ground-breaking research has since kicked off with the aim of discovering the causes of preterm birth. It is envisaged that such research would identify interventions that can be used to prevent or alleviate preterm birth within a period of three to five years.

Having reviewed the relevant and available literature, the researcher has realised and concluded that there is a lot of research that needs to be done in Namibia regarding the relationship between ANC adequacy (attendance and content of care) and preterm birth. There is little documentation which relates to the ANC content of care and any

reference to ANC adequacy is mainly made in relation to the number of visits rather than the quality of care.

2.6 CONCLUSION

In this chapter the researcher discussed preterm birth as a global problem. The prevalence, causes and effects of premature birth were discussed. The researcher went on to discuss antenatal care adequacy in detail. The timing of antenatal care together with the content of antenatal care globally, in Africa and in Namibia was reviewed. It emerged that women generally initiate ANC late. Some of the factors found to be associated with the late initiation of ANC include lengthy travelling time to health facilities, long waiting time at the facilities, high parity and gravidity, cultural beliefs and lack of awareness. Generally the content of ANC was found to be unsatisfactory. Factors negatively affecting the content of care were identified as the level of education, economic status, place of residency and distance from a health facility. Some of the studies reviewed indicated that ANC adequacy has an association with preterm birth. The researcher also elaborated on how addressing the MDGs can aid in the prevention of preterm birth. In conclusion, the literature on the various antenatal care activities that are essential for the reduction of preterm birth was discussed. The next chapter spells out the research methodology.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter describes the research design and methodology. A description of the research setting, research design, method and ethical considerations is done in detail. Under the research method a thorough description of sampling and the data collection method is done.

3.2 RESEARCH SETTING

Polit and Beck (2012:743) define a research setting as the actual site and circumstances in which data collection will take place. The setting for this study was a state hospital which is one of the major referral hospitals located in Windhoek in the Khomas region of Namibia.

3.3 RESEARCH DESIGN

The researcher used a quantitative, descriptive, correlational, retrospective, case control design. According to Joubert and Ehrlich (2007:77), a research design (also known as a study design), is the structured approach which researchers use to address a particular research question. The research design aims to provide results which are believable (Athanasou, Di Fabio, Elias, Ferreira, Gitchel, Jansen, Malindi, McMahon, Mpofu, Nieuwenhuis, Perry, Panulla, Pretorius, Seabi, Sklar, Theron & Watson 2012:81).

3.3.1 Quantitative

Numerical or statistical data are presented through the use of quantitative research methods. In addition to other uses, quantitative methods are used to explain relationships and to generalise from a small sample to a larger population (Du Plooy-Cilliers et al 2014:14). The researcher sought to quantify data and make a

generalisation of the results to all pregnant women. A deductive process was used to test the hypothesis that ‘there is a relationship between antenatal care adequacy and preterm births’.

3.3.2 Descriptive

Relationships between variables and characteristics of events can be described by employing descriptive statistics (Du Plooy-Cilliers et al 2014:75). Descriptive designs measure factors of interest without manipulating the participants. Numbers are used to describe entities (Athanasou et al 2012:88). In this study the researcher used descriptive statistics to describe the relationship between preterm birth and antenatal care adequacy.

3.3.3 Correlational

Du Plooy-Cilliers et al (2014:76) cite Kumar (2011) as stating that the aim of correlational studies is to find out if a relationship, association or interdependence exists between two or more aspects of a situation. The authors go on to further state that correlational studies examine the relationship between certain variables or how a dependent variable is affected by an independent variable.

A correlational design can be used to make predictions without inferring causality. This inability to identify cause-and-effect relationships between variables is one of the disadvantages of correlational studies (Athanasou et al 2012:87). This is supported by Polit and Beck (2012:226), who state that the aim of descriptive correlational research is to describe relationships among variables rather than support inferences of causality. The relationship between antenatal care adequacy and prematurity was simply described in a non-causal way.

3.3.4 Case control

In a case control study, the researcher starts with cases, that is, individuals who are manifesting the outcome of interest, and then selects an appropriate control, that is, individuals who do not have the outcome of interest. The researcher then collects exposure measurements and compares them between the 2 groups (Joubert & Ehrlich

2007:82). Cases were women aged 18 years and above with preterm new-borns and controls were women in the same age group with term new-borns. The outcome of interest was premature birth and exposure was ANC adequacy.

3.3.5 Retrospective

According to Du Plooy-Cilliers et al (2014:149), retrospective studies look back in time to assess what changes have transpired. Polit and Beck (2012:741) define a retrospective design as a study that starts with the exhibition of the dependent variable presently followed by an exploration for a supposed cause. In this study the researcher started with the manifestation of preterm birth followed by an exploration for the presumed cause, which is antenatal care inadequacy.

3.4 RESEARCH METHOD

Polit and Beck (2012:13) define research methods as techniques used to put together a study and to collect and analyse data relevant to the research question. Sampling and data collection approach and method are described in this section.

3.4.1 Sampling

Sampling involves selecting a group of people, events, behaviours, or other elements with which to conduct a study (Burns & Grove 2009:243). It can either be random or non-random. In this study, the researcher used non-random sampling to select cases consecutively. The researcher then selected controls using incidence density sampling.

3.4.1.1 Population

Du Plooy-Cilliers et al (2014:132) cite Wiid and Diggines (2013) as stating that the population is the aggregate number of individuals or elements from which data is required. Polit and Beck (2012:274) define the accessible population as the total number of cases that are available for a study and the target population as the total cases the findings of a research can be generalised to.

In this study, the target population was represented by all women aged 18 and above who gave birth to live babies in Namibia. The accessible population comprised of women who gave birth to live babies within the data collection period at the identified hospital. Data was collected from March to June 2015. About 250 babies are born per month at this hospital (Cullinan 2010:4) and 14.4 per 100 births are preterm in Namibia (WHO 2012:1). This brought the number of preterm births to approximately 36 per month and about 108 over 3 the months during which data was collected. Approximately 642 were term births. Thus the total accessible population was approximately 750.

3.4.1.2 Eligibility criteria

Polit and Beck (2012:726) define eligibility criteria as the standards defining the specific characteristics of the target population, by which people are chosen for inclusion in a study.

To be included in the study, primarily the woman should have given birth to a live baby during the period of data collection. The women were selected on the basis that they were aged 18 and above, and they were able to consent to the use of their ANC cards, to being asked any other questions and to sign the informed consent form. The researcher had intended to exclude all women who smoked or drank alcohol during pregnancy, however, from the records none of the women selected admitted to having indulged in smoking and / or alcohol consumption during pregnancy.

3.4.1.3 Sample size

A sample is a subset of a population (Polit & Beck 2012:742). One of the requirements of quantitative research is to draw a representative sample (Du Plooy-Cilliers et al 2014:135). Joubert and Ehrlich (2007:102) indicate that a sample should neither be too large as it may lead to wastage nor should it be too small as it may yield inconclusive results. The researcher employed the help of a statistician to calculate the sample size.

The following formula was used:

n = N / {1 + (Ne^2)}

Where ‘n’ was the sample size, ‘N’ was 750, which is the accessible population and ‘e’ was the sampling error of 0.1. A 90% confidence interval was assumed.

The formula yielded a sample size of 89. The researcher increased the sample size to 120 since a larger sample yields a more stable and reliable result. To increase the precision of the study, 2 controls were selected for each case since much more controls were available than cases, bringing the total number of cases to 40 and controls to 80. At least 1 case and 2 controls were selected per day of data collection.

3.4.1.4 Sampling technique

A sampling frame is a list of elements from which the sample will be chosen (Polit & Beck 2012:280). Random sampling was used to draw controls, whilst non-random sampling was used to draw cases. The sampling frame for the controls consisted of women aged 18 and above with term new-borns and meeting the eligibility criteria on a given day during the data collection period. This frame was constructed from the list of women found in the postnatal ward.

The researcher used consecutive sampling to draw cases who met the inclusion criteria from the accessible population until the sample size of 40 cases was obtained. Polit and Beck (2012:278) state that in consecutive sampling all individuals from the accessible population are enrolled over a specific time interval or until a particular sample size is achieved. On most days the researcher managed to get at least 1 case. On a few days the researcher managed to get up to 3 cases. Sampling was done whilst the women were still in hospital since that is when the ANC cards could be accessed.

Random selection of controls was done using incidence density sampling. According to Vandenbroucke and Pearce (2012:1486), in incidence density sampling (also known as density sampling, concurrent sampling or risk set sampling) one or more control subjects are sampled each time a case occurs. That is, every time a case is diagnosed one or more controls are selected from the cohort. In this study, the cohort was all

women aged 18 and above who had delivered a live baby during the data collection period. Two controls were selected per case. At least 8 controls were available per day. On any given day the maximum possible number of controls which could be sampled was 6 since only a maximum of 3 cases could be obtained per day. The researcher wrote down the names of the women who were on the sampling frame and placed them in an opaque container. The container was shaken and either 2 names or 4 names or 6 names (controls) were withdrawn depending on the cases found that day.

To reduce the number of confounding factors, the researcher had planned to exclude women who admitted to be smokers or alcohol consumers, however, none of the women asserted to either of the 2 according to the ANC records. Other possible confounders were controlled for during data analysis.

3.4.2 Data collection

Data collection is defined as the gathering of information to address a research problem (Polit & Beck 2012:725). Du Plooy-Cilliers et al (2014:147) state that data collection is one of the crucial aspects of any research study. According to Athanasou et al (2014:88), the research question guides the data collection method.

3.4.2.1 Data collection approach and method

The researcher used the quantitative approach for data collection. According to Du Plooy-Cilliers et al (2014:148, 92), quantitative research aims to establish causal relationships or correlations that can be generalised.

In quantitative research, researchers collect data in an organised and controlled method. A checklist was designed to capture the required information.

3.4.2.2 Development and testing of the data collection instrument

The researcher developed a checklist comprising of questions relating to personal and pregnancy related characteristics, and questions relating to antenatal care adequacy. To capture information that led to the categorisation of antenatal care adequacy, the

researcher used the APNCU index and the CTP tool. Thus the instrument developed involved the incorporation of existing instruments.

Kotelchuck (1994) designed the APNCU index (see Appendix A) to measure ANC attendance among pregnant women. This index takes into account the initiation of care (before or after the fourth month) and the number of visits during pregnancy. It assigns women into four categories regarding ANC adequacy, and these are: inadequate (less than 50% attendance), intermediate (50 to 79% attendance), adequate (80 to 109% attendance) and adequate plus (greater than or equal to 110% attendance). The CTP tool (see Appendix B) was designed by Beeckman et al (2012a:366) and it evaluates the provision of a minimal care package recommended for every pregnancy, regardless of parity or risk status. It also assigns women into four categories with the inadequate category representing initiation of care after the 14th week of gestation, or the provision of one of the 3 interventions lower than the minimum recommended. The appropriate category represents women starting care before the 14th week of gestation and having been provided with all 3 interventions for at least the minimum recommended number of times and these named interventions occurring in the 3 relevant trimesters of pregnancy according to guidelines. The other 2 categories, intermediate and sufficient vary between these 2 categories. The said interventions are blood screening tests, ultrasound examinations and blood pressure measurements (Beeckman et al 2012a:366-367).

Pretesting of data collection instruments involves the trial administration of a newly developed instrument to identify problems or assess time requirements (Polit & Beck 2012:739). The researcher pre-tested the checklist on 3 cases and 6 controls, 2 months before data collection commenced. The researcher sampled subjects for the pilot study in January 2015 after receiving ethical clearance from the University of South Africa (see Appendix F). ANC records for women who had given birth after 28 weeks gestation but before 37 weeks were used as cases whereas records for those who had given birth after 37 weeks were used as controls. Sampling and data collection for the pilot occurred over 2 days. This sample was made up of women who had just been discharged from the postnatal ward of the same hospital. There was no ambiguity of the checklist items picked up, however, the researcher noted that marital status had been omitted from the checklist, and this was then added. The results of the pilot were not included in the final study.

3.4.2.3 Characteristics of the data collection instrument

The researcher used a checklist (see Appendix C) to collect data from women who met the inclusion criteria. Part A of the checklist consisted of personal and pregnancy related characteristics. Personal related characteristics included age, occupation, marital status, place of residence and level of education. Pregnancy related characteristics included parity, obstetric history (previous preterm birth, low birth weight, miscarriage/or still birth and admission to neonatal care), and medical history (high blood pressure, gestational diabetes, preterm contractions, hospital admissions and anaemia).

Part B consisted of questions derived from the APNCU index and Part C comprised of questions derived from the CTP tool. Categorisation of antenatal care adequacy was done at the end of Part B and Part C of the checklist.

3.4.2.4 Data collection process

Data collection occurred concurrently with sampling, that is, for each day cases and controls were selected and the checklists were filled in. The researcher considered this practical since at least 3 (1 case 2 controls) and at most 9 (3 cases 6 controls) women's records could be selected per day. Information gathered was on personal and pregnancy related characteristics, the timing of initiation of care, the number of ANC visits and the number and timing of the interventions for each woman. In addition to the information obtained from the ANC cards, women were asked to state their level of education and whether they had any of their babies in the past admitted to a neonatal ward, as part of the personal and pregnancy related characteristics.

3.4.3 Data analysis

Data were coded and entered into EPI info and analysis was done using SPSS version 20. Descriptive statistics were used to analyse personal and pregnancy related characteristics. Unadjusted odds and also adjusted odds ratio (in relation to confounders) were calculated to analyse the relationship between ANC adequacy and preterm birth.

3.5 ETHICAL CONSIDERATIONS

Ethical considerations according to Joubert and Ehrlich (2007:52), explain the plans for safeguarding the rights and welfare of participants. The Belmont Report articulated 3 broad principles on which standards of ethical research are based: beneficence, respect for human dignity, and justice (Polit & Beck 2012:152).

3.5.1 The principle of beneficence

Beneficence imposes a duty on the researcher to minimise harm and maximise benefits (Polit & Beck 2012:152). There was no perceived harm to the women whose records were used. However since women had to consent to the use of their records and to being asked a couple of questions, the researcher explained to the women that information obtained was not going to be used against them.

3.5.2 The principle of justice

Justice includes participants' right to fair treatment and their right to privacy (Polit & Beck 2012:152). The right to fair treatment upholds that each person should be treated fairly and should receive what he or she is due or owed (Burns & Grove 2009:198). The researcher did not promise any stipends to those who agreed to have their ANC information used but promised to avail a copy of the study findings to them and to the hospital.

'Privacy is an individual's right to determine the time, extent, and general circumstances under which personal information will be shared with or withheld from others' (Burns & Grove 2009:195). Health information collected was de-identified by using codes instead of names on the checklist. Biographical data collected only included age, occupation, marital status, place of residence and level of education. All the checklists were kept under lock and key with only the researcher having access to the storage place during data collection. At the end of data collection the only other individual who accessed the data was the statistician.

3.5.3 The principle of respect for human dignity

Respect for human dignity entails treating individuals as autonomous agents and ensuring that individuals with diminished autonomy are protected (Joubert & Ehrlich 2007:32). The researcher upheld this principle by keeping information obtained in confidence. Consent was sought from the women for the use of their ANC information (see Appendix E). The women were given a briefing on the study (translators were used where necessary) prior to signing the informed consent (see Appendix D).

3.5.4 Ethical clearance

To obtain clearance to conduct the research, the researcher submitted a research proposal to the University of South Africa (UNISA) Departmental Higher Degrees Committee which then issued a clearance letter after the proposal was deemed to have met the stipulated requirements (see Appendix F). To obtain approval to conduct the study at the hospital, the researcher wrote a letter (see Appendix G) to the permanent secretary of health seeking approval. In this letter the researcher stated her field of study, the research topic, the intended site of data collection, the topic and purpose of research, the age group of the participants, and how data was to be collected. The researcher attached the research proposal and the UNISA ethical clearance to this letter. Approval letters were issued by both the office of the permanent secretary (see Appendix H) and the hospital where data collection took place (see Appendix I).

3.6 RELIABILITY AND VALIDITY OF THE STUDY

Reliability refers to the repeatability or reproducibility of a measurement or study finding. It is how close a measurement or result of a study comes to the truth (Joubert & Ehrlich 2007:155, 156). Reliability is about the credibility of a study, the extent to which results can be generalised and it calls for consistency, whereas validity involves determining whether the research instrument measures what it is supposed to measure (Du Plooy-Cilliers et al 2014:254, 256).

The following measures were done by the researcher to ensure the reliability and validity of the instrument.

- Incorporation of standardised APNCU and CTP tools into the instrument.
- The tool was given to some midwives to check if, at face value, it appeared to measure what it was supposed to measure.
- Using a sample size larger than the statistically calculated one to ensure adequate representation hence generalisability of study findings.
- Pre testing of the instrument was done using ANC records of 3 women who met the eligibility criteria for cases and 6 women who met the eligibility criteria for controls, 2 months before data collection commenced to ensure stability and consistency of the data collection instrument. The researcher noted that “marital status” had been erroneously omitted from the checklist. Necessary corrections were made.
- Checking of all checklists for completeness at the end of each data collecting day.

3.7 CONCLUSION

In order to address a particular question in quantitative research, researchers use a structured approach. In this chapter a comprehensive description of the research design and method was done. The description focused on the research setting, design, method and ethical considerations.

CHAPTER 4

ANALYSIS AND PRESENTATION OF DATA

4.1 INTRODUCTION

In this chapter the results are presented. The researcher starts off by giving a brief description of data management and analysis. An analysis of results then follows which includes the explanation of the findings. The presentation of the results is done under three main categories that is, sample demographics (personal characteristics), pregnancy related characteristics, the APNCU index in measuring ANC and finally the CTP tool in measuring ANC adequacy.

The purpose of the study was to investigate the relationship between ANC adequacy and preterm births. The objectives of this study were:

- To describe the adequacy of the ANC received by women who delivered at one state hospital in Windhoek between March 2015 and June 2015.
- To determine the level of association between ANC adequacy and preterm birth.

The researcher used a checklist to collect data. The sources of data were antenatal care records of women who delivered during the data collection period and met the inclusion criteria. Responses for a couple of items were sought verbally from the women.

4.2 DATA MANAGEMENT AND ANALYSIS

The researcher together with the statistician checked data for completeness. Data were cleaned and inconsistencies were corrected. Data were coded and entered into EPI info and analysis was done using SPSS version 20. Personal and pregnancy related characteristics were analysed using descriptive statistics. Unadjusted odds and also adjusted odds ratio (in relation to confounders) were calculated to analyse the relationship between ANC adequacy and preterm birth.

4.3 RESEARCH RESULTS

4.3.1 Sample demographics

The demographic characteristics considered in this research included the age, the marital status, level of education, occupation and place of residence. Analysis was done for the whole sample (N=120).

4.3.1.1 Age

From the data collected, the average age was 27 years with the minimum being 18 years old and the maximum being 42 years. Most of the women were aged 26 years whereas only one woman was older than 40 years (see Table 4.1 on page 51 and Figure 4.1 on page 52).

4.3.1.2 Marital status

In total single women were 97 (80.8%) whilst the married were 20 (16.7%). Of note is that most women were single and this could be due to the fact that those cohabitating were considered as single since they were not legally married. Marital status was unspecified for 3 women, that is, 2.5% of the total sample (see Table 4.2 on page 51). Thirty four (35.1%) of the single women had preterm birth whilst 6 (30%) of the married had preterm birth. Sixty three (64.9%) of the single women gave birth at term whilst 14 (70%) of the married women gave birth at term (see Table 4.3 on page 51 and Figure 4.2 on page 52). The percentage of women who gave birth prematurely was slightly higher within the single women as compared to married women. Watson-Jones et al (2007:11) found that marital status was one of the social factors associated with preterm birth.

APNCU and marital status: Of the single women, 1 (1%), had adequate plus ANC, 5 (5.1%) had adequate ANC, 25 (25.8%) had intermediate ANC whilst 66 (68%) had inadequate ANC. Of the married women, 1 (5%) had adequate plus ANC, 2 (10%) had adequate ANC, 5 (25%) had intermediate ANC whilst 12 (60%) had inadequate ANC. All the 3 (100%) women who had marital status as unspecified had inadequate ANC (Table 4.4 on page 52).

CTP and marital status: Of the 97 single women, 1 (1%) had appropriate ANC, 2 (2.1%) had sufficient ANC, 13 (13.4%) had intermediate ANC and 81 (83.5%) had inadequate ANC. Of the married women, 1 (5%) had appropriate ANC, 1 (5%) had sufficient ANC, 6 (30%) had intermediate ANC and 12 (60%) had inadequate ANC. All 3 (100%) women with unspecified ANC had inadequate ANC. A higher proportion (30%) of the married women had intermediate ANC compared to 13.4% single women who had the same care. A higher percentage of single women had sufficient and inadequate ANC as compared to married women (see Table 4.5 on page 53).

Thus the influence of marital status on ANC adequacy was not evident in this study. In contrast, Mametja (2009:59) found that marriage among other factors was associated with reduced risks of late ANC attendance.

Table 4.1: Age measures of central tendency (N=120)

N	120
Mean	27.37
Median	26.00
Std. deviation	5.972
Variance	35.663
Minimum	18
Maximum	42
Sum	3284

Table 4.2: Marital status information (N=120)

Marital status	**Frequency**	**Percentage**
Unspecified	3	2.5
Married	20	6.7
Single	97	80.8
Total	**120**	**100.0**

Table 4.3: Pregnancy outcome and marital status (N=120)

Marital status	**Preterm**	**Full term**	**Total**
Single	34	63	97
Married	6	14	20
Unspecified	0	3	3
Total	**40**	**80**	**120**

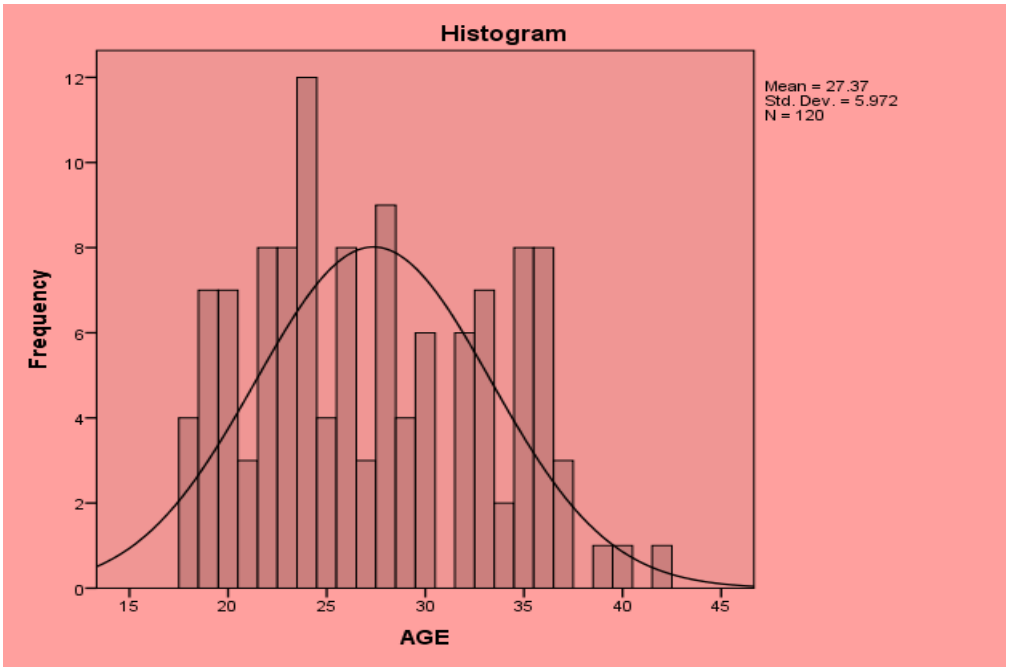

Figure 4.1: Age frequency distribution (N=120)

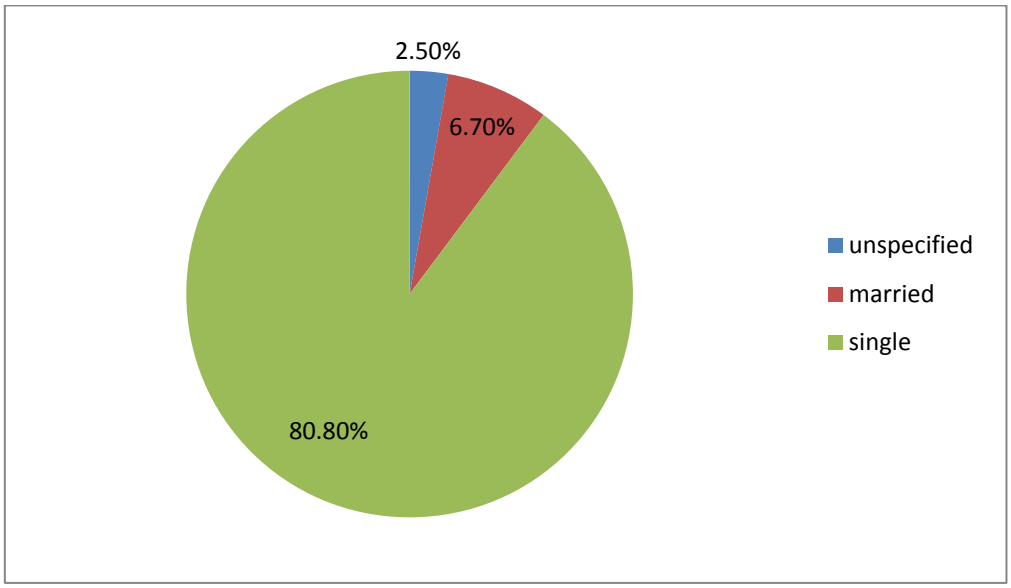

Figure 4.2: Marital status (N=120)

Table 4.4: APNCU and marital status (N=120)

Marital status	Adequate plus	Adequate	Intermediate	Inadequate	Total
Single	1	5	25	66	97
Married	1	2	5	12	20
Unspecified	0	0	0	3	3
Total	**2**	**7**	**30**	**81**	**120**

Table 4.5: CTP and marital status (N=120)

Marital status	Appropriate	Sufficient	Intermediate	Inadequate	Total
Single	1	2	13	81	97
Married	1	1	6	12	20
Unspecified	0	0	0	3	3
Total	**2**	**3**	**19**	**96**	**120**

4.3.1.3 Occupational status

Of the 120 women, 58 (48.3%) had some form of employment, 42 (35%) were unemployed and 20 (16.7%) were students (Table 4.6 on page 54 and Figure 4.3 on page 54). Out of 58 woman who were employed, 19 (32.8%) had preterm deliveries and 39 (67.2%) had term deliveries. Fifteen (36%) of the unemployed gave birth prematurely and 27 (64%) had term deliveries. From the 20 women who were students, 6 (30%) had premature deliveries, whilst 14 (70%) had term deliveries. Preterm delivery was more likely in the unemployed group followed by the employed group and less likely among students (Table 4.7 on page 55). Within each occupation group, the probability of giving birth prematurely was almost similar to that of giving birth at term. Watson-Jones et al (2007:11) state that occupation had an effect on pregnancy outcome (that is delivering before term). In this study being employed or being a student decreased the probability of a preterm delivery.

APNCU and occupational status: Of the 58 employed women, 2 (3.4%) had adequate plus ANC, 6 (10.3%) women had adequate ANC, 15 (25.9%) had intermediate ANC and 35 (60.3%) had inadequate ANC. Of the 42 unemployed women, none (0%) had adequate plus ANC, 1 (2.4%) had adequate ANC, 8 (19%) had intermediate ANC and 33 (78.6%) had inadequate ANC. Of the 20 women who were students, none (0%) had either adequate plus ANC or adequate ANC, 7 (35%) had intermediate ANC and 13 (65%) had inadequate ANC (Table 4.8 on page 55). Within the group of employed women, the likelihood of having received adequate plus (3.4%) and adequate (10.3%) was higher than it was for women within the other groups. This is indicated by only 2.4% and 0% of the unemployed group having adequate plus ANC and adequate ANC respectively, together with 0% of the students who had received either adequate plus or adequate ANC.

CTP and occupational status: Of the 58 employed women, 1 (1.7%) had appropriate ANC, 2 (3.4%) had sufficient ANC, 13 (22.4%) had intermediate ANC and 42 (72.4%) had inadequate ANC. Of the 42 unemployed women, 1 (2.4%) had appropriate ANC, 1 (2.4%) had sufficient ANC, 4 (9.5%) had intermediate ANC and 36 (85.7%) had inadequate ANC. Of the 20 students, none (0%) had either appropriate ANC or sufficient ANC, 2 (10%) had intermediate ANC and 18 (90%) had inadequate ANC. The probability of having received intermediate care or adequate care was most likely within the employed group as compared to the other 2 groups (see Table 4.9 on page 55).

These findings are supported by Beeckman, Louckx and Putman (2012b:69), who stated that being unemployed was associated with a lesser likelihood of being in a higher CTP category.

Table 4.6: Occupational status information (N=120)

Occupation	Frequency	Percentage
Employed	58	48.3
Unemployed	42	35.0
Student	20	16.7
Total	**120**	**100.0**

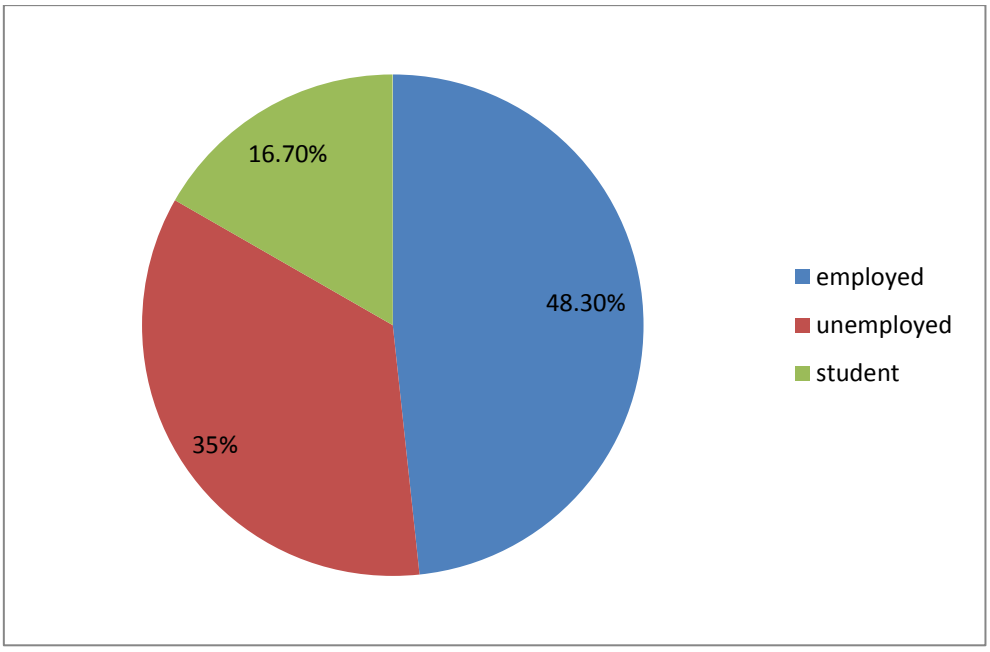

Figure 4.3: Occupational status (N=120)

Table 4.7: Pregnancy outcome and occupational status (N=120)

Occupational status	Preterm birth	Full term birth	Total
Employed	19	39	58
Unemployed	15	27	42
Student	6	14	20
Total	**40**	**80**	**120**

Table 4.8: APNCU and occupational status (N=120)

Occupation	Adequate plus	Adequate	Intermediate	Inadequate	Total
Employed	2	6	15	35	58
Unemployed	0	1	8	33	42
Student	0	0	7	13	20
Total	**2**	**7**	**30**	**81**	**120**

Table 4.9: CTP and occupational status (N=120)

Occupation	Appropriate	Sufficient	Intermediate	Inadequate	Total
Employed	1	2	13	42	58
Unemployed	1	1	4	36	42
Student	0	0	2	18	20
Total	**2**	**3**	**19**	**96**	**120**

4.3.1.4 Place of residence

Information on the place of residence for all the 120 women is shown on Table 4.10 (below) and Table 4.15 (on page 57). For women residing outside Windhoek the name of town was captured and for those residing within Windhoek the particular location was recorded. From the total sample of 120 women, 93 (77.5%) resided in Windhoek whilst 27 (22.5%) resided outside Windhoek. As is shown in Table 4.11 (below), of the 93 residing in Windhoek, 15 (16.1%) resided in medium density locations, 75 (80.6%) resided in the high density areas and 3 (3.2%) resided in low density areas.

Table 4.10: Place of residence information (N=120)

Place of residence	Frequency	Percentage
Within Windhoek	93	78
Outside Windhoek	27	22
Total	**120**	**100**

Table 4.11: Residential class within Windhoek information (N=93)

Residential class	Frequency	Percentage
Low density	3	3
Medium density	15	16
High density	75	81
Total	**93**	**100**

Twenty out of the 40 cases (50%) stayed in Windhoek whilst 20 (50%) stayed outside Windhoek. 73 out of the 80 controls (91.3%) stayed in Windhoek whilst 7 (8.7%) stayed outside Windhoek. In terms of residence, the cases were equally divided between Windhoek and outside Windhoek (see Table 4.12 below). Most of the controls, however, were from within Windhoek. This could be due to the fact that the study site is a referral hospital thus having a significant number of preterm deliveries from referred women. Of those staying in Windhoek low density areas, 1 (33.3%) delivered prematurely and 2 (66.6%) delivered at full term. Of the women staying in Windhoek medium density suburbs, 3 (20%) delivered preterm and 12 (80%) delivered at full term, whereas 17 (22.3%) delivered preterm and 58 (77.3%) delivered at term from those staying in Windhoek high density areas (see Table 4.13 below). Thus a woman staying in the high density area had a slightly higher (22.3%) chance of delivering before term.

Table 4.12: Pregnancy outcome and residency (N=120)

Place of residence	Preterm birth	Full term birth	Total
Within Windhoek	20	73	93
Outside Windhoek	20	7	27
Total	**40**	**80**	**120**

Table 4.13: Pregnancy outcome and residential class within Windhoek (N=93)

Residential class	Preterm	Full term	Total
Low density	1	2	3
Medium density	3	12	15
High density	17	58	75
Total	**21**	**72**	**93**

Table 4.14: APNCU and residency (N=120)

Place of residence	Adequate plus	Adequate	Intermediate	Inadequate	Total
Within Windhoek	0	6	27	60	93
Outside Windhoek	2	1	3	21	27
Total	**2**	**7**	**30**	**81**	**120**

Table 4.15: Place of residence for each woman (N=120)

Place of residence	Frequency	Percentage
Braakwater	1	0.8
Cimbebasia	1	0.8
Eros	1	0.8
Finkenstein	1	0.8
Freedomland	1	0.8
Grysblock	1	0.8
Goreangab	5	4.2
Greenwell	6	5.0
Grootfontein	2	1.7
Hakahana	3	2.5
Havanna	8	6.7
Hochland park	1	0.8
Keetmanshoop	2	1.7
Khomasdal	8	6.7
Mariental	1	0.8
Okahandja	6	5.0
Okamatapati	1	0.8
Ondangwa	1	0.8
Oshakati	1	0.8
Oshinene	1	0.8
Otavi	1	0.8
Otjiwarongo	2	1.7
Otjo	1	0.8

Place of residence	Frequency	Percentage
Otjomuise	9	7.5
Rehoboth schlip	1	0.8
Rhino park	1	0.8
Rocky crest	1	0.8
Roshpinah	1	0.8
Rundu	1	0.8
Shandumbala	2	1.7
Soweto	6	5.0
Swakopmund	4	3.3
Walvisbay	1	0.8
Wanaheda	8	6.7
Dorado park	3	2.5
Katutura	16	13.3
Okuryangava	5	4.2
Ombili	5	4.2
Total	**120**	**100.0**

APNCU and place of residency: As is shown on Table 4.14 (page 57), out of the 93 who stayed in Windhoek, none had adequate plus ANC, 6 (6.5% had adequate ANC, 27 (29%) had intermediate ANC and 60 (64.5%) had inadequate ANC. Of the 27 residing outside Windhoek, 2 (7.4%) had adequate plus ANC, 1 (3.7%) had adequate ANC, 3 (11.1%) had intermediate ANC and 21 (77.8%) had inadequate ANC. A woman staying in Windhoek had a 0% chance of having received adequate plus ANC, whereas one staying outside had a 7.4% chance of having received adequate plus ANC among other women of similar residency.

CTP and place of residence: One woman (1%) had appropriate ANC, another 1 (1%) had sufficient ANC, 18 (19.4%) had intermediate ANC and 73 (78.5%) had inadequate ANC from those who stayed in Windhoek. Of those who stayed outside Windhoek, 1 (3.7%) had appropriate ANC, 2 (7.4%) had sufficient ANC, 1 (3.7%) had intermediate ANC and 23 (85%) had inadequate ANC (see Table 4.16 below). Care was likely to have been sufficient for a woman who came from outside Windhoek.

Table 4.16: CTP and residency (N=120)

Place of residence	Appropriate	Sufficient	Intermediate	Inadequate	Total
Within Windhoek	1	1	18	73	93
Outside Windhoek	1	2	1	23	27
Total	**2**	**3**	**19**	**96**	**120**

The explanation could be that women who are referred to Windhoek for delivery were likely to have had problematic pregnancies hence more intensive ANC in terms of early initiation and number of visits.

4.3.1.5 Educational level

Two (100%) of the women who had no education at all gave birth prematurely. Whilst 13 women had primary education of which 4 (30.8%) gave birth prematurely and 9 (69.2%) gave birth at term. Fourty-four women had their highest level of education stated as grade 10, and of these 50% had preterm deliveries and the other 50% had term deliveries. Thirty-seven women had grade 12 and of these 7 (18.9%) had preterm births and 30 (81.1%) had term births. Twenty-four women had tertiary level of education of which 5 (20.8%) gave birth prematurely and 19 (79.2%) gave birth at term (see Tables 4.17 and 4.18 below, and Figure 4.4 on page 60). Within the grade 10 educational level group (most women were in this category), the chance of delivering prematurely was equal to that of delivering at term. Generally with the decreasing level of education the probability of delivering prematurely increased within each educational level.

Table 4.17: Level of education information (N=120)

Level of education	Frequency	Percentage
None	2	1.7
Primary	13	10.8
Grade 10	44	36.7
Grade 12	37	30.8
Tertiary	24	20.0
Total	**120**	**100.0**

Table 4.18: Level of education and pregnancy outcome (N=120)

Level of education	Preterm	Term	Total
None	2	0	2
Primary	4	9	13
Grade 10	22	22	44
Grade 12	7	30	37
Tertiary	5	19	24
Total	**40**	**80**	**120**

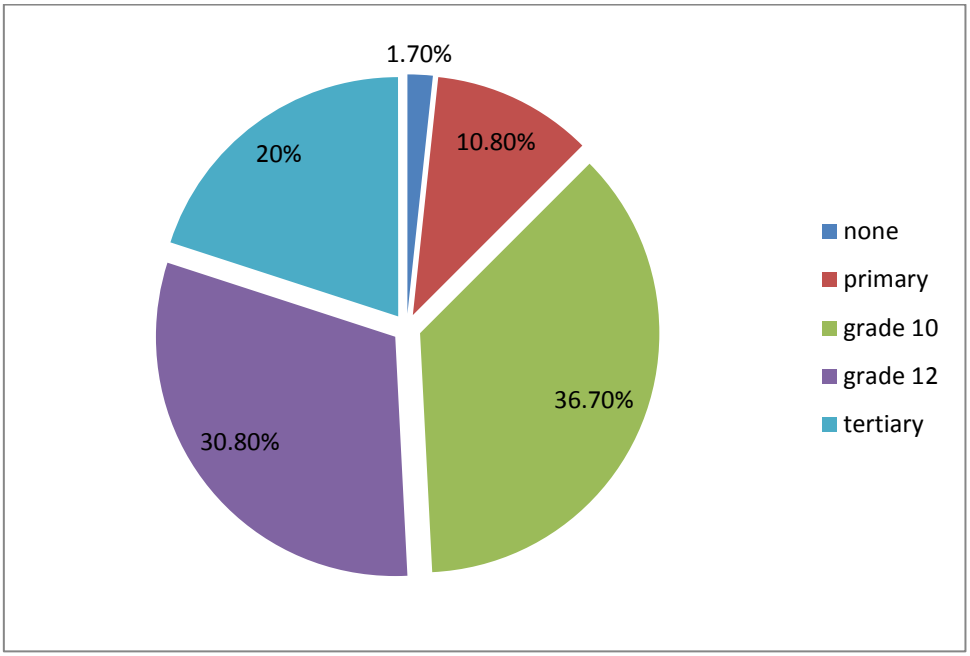

Figure 4.4: Level of education (N=120)

Table 4.19: APNCU and educational level (N=120)

Education level	Adequate plus	Adequate	Intermediate	Inadequate	Total
None	0	0	0	2	2
Primary	0	0	2	11	13
Grade 10	0	3	11	30	44
Grade 12	1	1	12	23	37
Tertiary	1	3	5	15	24
Total	**2**	**7**	**30**	**81**	**120**

APNCU and educational level: Both women with no form of education had inadequate ANC. Of the 13 with primary education, none (0%) had adequate or adequate plus ANC, 2 (15.4%) had intermediate ANC and the remaining 11 (84.6%) had inadequate ANC. Out of the 44 women with grade 10, none had adequate plus ANC, 3 (6.8%) had adequate ANC, 11 (25%) had intermediate ANC and 30 (68%) had inadequate ANC. Of the 37 women with grade 12, 1 (2.7%) had adequate plus ANC, 1 (2.7%) had adequate ANC, 12 (32.4%) had intermediate ANC whilst 23 (62.2%) had inadequate ANC. Of the 24 women with tertiary education, 1 (4.2%) had adequate plus ANC, 3 (12.5%) had adequate ANC, 5 (20.8%) had intermediate ANC and 15 (62.5%) had inadequate ANC (see Table 4.19 on page 60). Women with a higher level of education were more likely to be rated as having adequate plus, adequate or intermediate ANC as compared to women with lower levels of education.

CTP and educational level: Both (100%) women with no form of education had inadequate ANC. Of the 13 women with primary education, 1 (7.7%) had appropriate ANC, none (0%) had sufficient ANC, 1 (7.7%) had intermediate ANC and 12 (92.3%) had inadequate ANC. Of the women with grade 10, 1 (2.3%) had appropriate ANC, none (0%) had sufficient ANC, 3 (6.8%) had intermediate ANC and 40 (90.9%) had inadequate ANC. Of the 37 women with grade 12, none (0%) had appropriate ANC, 2 (5.4%) had sufficient care, 10 (27%) had intermediate ANC and 23 (62.2%) had inadequate ANC. Of the 24 women with tertiary education, none had appropriate ANC, 1 (4.2%) had sufficient ANC, 5 (20.8%) had intermediate ANC and 18 (75%) had inadequate ANC (see Table 4.20 below). The probability of having received inadequate care was higher in the less educated group.

Table 4.20: CTP and level of education (N=120)

Level of education	Appropriate	Sufficient	Intermediate	Inadequate	Total
None	0	0	0	2	2
Primary	1	0	1	12	13
Grade 10	1	0	3	40	44
Grade 12	0	2	10	23	37
Tertiary	0	1	5	18	24
Total	**2**	**3**	**19**	**96**	**120**

These findings are supported by other studies. Zhao et al (2012:6) found that educational level among other factors was indeed associated with the adequate utilisation of ANC. According to Joshi et al (2014:9), studies show that more educated women and women from higher income households tend to receive a better quality of ANC. In the 2000 NDHS, the MoHSS (2003:17) reported that in Namibia among the uneducated women, the proportion that did not receive ANC at all was more than one in five women, and 99% of the educated women received ANC.

4.3.2 Pregnancy related characteristics

4.3.2.1 Gestation

The average gestation was 36.58 weeks and most women delivered at 38 weeks. It was expected that the mode will be above 37 weeks and the mean will be close to or above 37 weeks too since controls were twice the number of cases. The minimum gestation was 28 weeks and the maximum was 42 weeks (see Table 4.21 below).

Table 4.21: Gestation measures of central tendency (N=120)

Measure of central tendency	Gestation
N	120
Mean	36.58
Median	38.00
Mode	38.00
Std deviation	4.041
Variance	16.330
Minimum	28
Maximum	42

4.3.2.2 Parity

For the majority of the women (45 women or 37.5%), the current delivery was their first. 43 (35.8%) women had a parity of 2, 21 (17.5%) had a parity of 3 and 5 (4.2%) had a parity of 4. From the remaining 6 women, 4 (3.3%) had a parity of 5 and 2 (1.7%) had a parity of 6. Of the women with a parity of 1, 14 (31.1%) had preterm deliveries and 31(68.9%) delivered at term. Of those with a parity of 2, 14 (32.6%) delivered prematurely and 29 (67.4%) delivered at term. Eight (38.1%) of the para 3 women

delivered prematurely whilst the remaining 13 (61.9%) delivered at term. Among the para 4 women, 2 (40%) delivered prematurely and 3 (60%) delivered at term. Of the women with a parity of 5, 1(25%) delivered prematurely and 3 (75%) delivered at term. Whilst 1 (50%) of the 2 para 6 women delivered prematurely and the other (50%) delivered at term (see Table 4.22 below). With the exception of women with a parity of 5, the chances of preterm deliveries increased with parity.

Table 4.22: Pregnancy outcome and parity (N=120)

Parity	Preterm	Full term	Total
1	14	31	45
2	14	29	43
3	8	13	21
4	2	3	5
5	1	3	4
6	1	1	2
Total	**40**	**80**	**120**

Table 4.23: Parity and the APNCU (N=120)

Parity	Adequate plus	Adequate	Intermediate	Inadequate	Total
1	1	1	15	28	45
2	1	3	11	28	43
3	0	2	2	17	21
4	0	0	2	3	5
5	0	1	0	3	4
6	0	0	0	2	2
Total	**2**	**7**	**30**	**81**	**120**

APNCU and parity: Of all the women with a parity of 1, 1 (2.2%) had adequate plus ANC, the other 1 (2.2%) had adequate ANC whilst 15 (33.3%) had intermediate ANC and 28 (62.2%) had inadequate ANC. Of the women with a parity of 2, 1 (2.3%) had adequate plus ANC, 3 (7%) had adequate ANC, 11 (25.6%) had intermediate ANC and 28 (65.1%) had inadequate ANC. None (0%) of the women with a parity of 3 had adequate plus ANC, whereas 2 (9.5%) of the women with the same parity had adequate ANC, the other 2 (9.5%) had intermediate ANC, whilst the last 17 (81%) had inadequate ANC. Of all the women with a parity of 4 and 6, none (0%) had either adequate plus ANC or adequate ANC. Two (40%) women with a parity of 4 had intermediate ANC and

3 (60%) had inadequate ANC. None (0%) of the women with a parity of 5 and 6 had intermediate ANC, whereas 3 (75%) of the women with a parity of 5 had inadequate care and 1 (25%) had adequate ANC. Both (100%) para 6 women had inadequate ANC (see Table 4.23 above). Women with a higher parity were less likely to be assigned to a higher level of ANC adequacy.

CTP and parity: When the CTP was used, none (0%) of the women with a parity of 1, 3, 4 and 6 had appropriate ANC. None (0%) of the women with a parity of 3, 4, 5 and 6 had sufficient ANC and again none (0%) of the women with a parity of 4, 5 and 6 had intermediate ANC. Only 1 (2.2%) from all the women with a parity of 1 had sufficient care, whilst 8 (17.8%) had intermediate ANC and 36 (80%) had inadequate ANC. Of the women with a parity of 2, 1 (2.3%) had appropriate ANC, 2 (4.6%) had sufficient ANC, 9 (20.9%) had intermediate, ANC whilst 31 (72.1%) had inadequate ANC. Of those with a parity of 3, 2 (9.5%) had intermediate ANC whilst 19 (90.5%) had inadequate ANC. All (100%) women with a parity of 4 had inadequate ANC. Of the women with a parity of 5, a single woman (25%) had appropriate ANC, with the other 3 (75%) having had inadequate ANC. All (100%) women with a parity of 6 had inadequate ANC (see Table 4.24 below). Thus the quality of ANC decreased with increasing parity.

According to Banda et al (2012:34), women of a higher parity (and also gravidity) tend to initiate ANC late. This late initiation of care leads to inadequate ANC.

Table 4.24: CTP and parity (N=120)

Parity	Appropriate	Sufficient	Intermediate	Inadequate	Total
1	0	1	8	36	45
2	1	2	9	31	43
3	0	0	2	19	21
4	0	0	0	5	5
5	1	0	0	3	4
6	0	0	0	2	2
Total	**2**	**3**	**19**	**96**	**120**

4.3.2.3 Gravidity

Table 4.25: Pregnancy outcome and gravidity (N=120)

Gravidity	Preterm	Full term	Total
1	13	34	47
2	15	20	35
3	5	17	22
4	3	2	5
5	3	2	5
6	1	4	5
7	0	1	1
Total	**40**	**80**	**120**

For 47 (39.2%) of the women, the pregnancy which resulted in the current delivery was their first. Thirty-five (29.2%) women had a gravidity of 2, 22 (18.3%) had a gravidity of 3 and only 1 (0.8%) woman had a gravidity of 7, whilst the gravidity of 4, 5 and 6 had 5 (4.2%) women each. Thirteen (27.7%) of the women with a gravidity of 1 had preterm deliveries whilst 34 (72.3%) had full term deliveries. Fifteen (42.9%) of the gravida 2 women had preterm deliveries, whilst 20 (57.1%) had term births. Among the gravida 3 women, 5 (22.7%) delivered before term and 17 (77.3%) delivered at term. Three (60%) women with a gravidity of 4 delivered prematurely, whilst 2 (40%) delivered at term. Of the gravida 5 women, 3 (60%) delivered prematurely, whilst 2 (40%) delivered at term. One (20%) woman from those with a gravidity of 6 delivered prematurely, whilst 4 (80%) delivered at term. The only woman with a gravidity of 7 delivered at term (see Table 4.25 above).The probability of preterm delivery varied from one gravidity group to the next.

APNCU and gravidity: Adequate plus ANC and adequate ANC had 1(2.1%) woman each from those with a gravidity of 1. The other 16 (34%) women with a gravidity of 1 had intermediate ANC and 29 (61.7%) had inadequate ANC. Of the women with a gravidity of 2, only 1 (2.8%) had adequate plus ANC, 3 (8.6%) had adequate ANC, whilst 6 (17.1%) had intermediate ANC and 25 (71.4%) had inadequate ANC. None (0%) of the gravida 3, 4, 5, 6 and 7 had adequate plus ANC. Two (9.1%) of the gravida 3 women had adequate ANC and the other 3 (13.6%) had intermediate ANC, whilst the rest 17 (77.3%) had inadequate ANC. Of the gravida 4 women, 2 (40%) had intermediate ANC and 3 (60%) had inadequate ANC. One (20%) from the gravida 5

women had adequate ANC whilst intermediate ANC and inadequate ANC had 2 (40%) women each. Of the gravida 6 women, 1 (20%) had intermediate ANC and 4 (80%) had inadequate ANC. The only woman who was gravida 7 had inadequate ANC (see Table 4.26 below).

Table 4.26: APNCU and gravidity (N=120)

Gravidity	Adequate plus	Adequate	Intermediate	Inadequate	Total
1	1	1	16	29	47
2	1	3	6	25	35
3	0	2	3	17	22
4	0	0	2	3	5
5	0	1	2	2	5
6	0	0	1	4	5
7	0	0	0	1	1
Total	**2**	**7**	**30**	**81**	**120**

Table 4.27: CTP and gravidity (N=120)

Gravidity	Appropriate	Sufficient	Intermediate	Inadequate	Total
1	0	1	10	36	47
2	1	2	3	29	35
3	0	0	5	17	22
4	0	0	0	5	5
5	1	0	0	4	5
6	0	0	1	4	5
7	0	0	0	1	1
Total	**2**	**3**	**19**	**96**	**120**

CTP and gravidity: None (0%) of the gravida 1, 3, 4, 6 and 7 had appropriate ANC. Again none (0) of the 3, 4, 5, 6 and 7 had sufficient ANC and none (0%) of the gravida 4, 5 and 7 had intermediate ANC. Inadequate ANC had the majority, that is, 36 (76.6%) of the gravida 1 women, whereas 10 (21.3%) had intermediate ANC and 1 (2.1%) had adequate ANC. Of the gravida 2 women, 29 (82.9%) had inadequate ANC, 3 (8.6%) had intermediate ANC, 2 (5.7%) had sufficient ANC and only 1 (2.9%) had appropriate ANC. Seventeen (77.3%) of the gravida 3 women had inadequate ANC, whilst the other 5 (22.7%) had intermediate ANC. All 5 (100%) gravida 4 women had inadequate ANC. One (20%) woman from the gravida 5 category had appropriate ANC with the remaining 4 (80%) having inadequate ANC. From the gravida 6 women, 4 (80%) had inadequate

ANC, whilst 1 (20%) had intermediate ANC (see Table 4.27 above). When the CTP was used, fewer women fell into the appropriate and sufficient category as compared to the women who fell into adequate plus and adequate ANC when the APNCU was used. ANC was mostly inadequate. ANC adequacy decreased with increasing gravidity. This is supported by Banda et al (2012:34) who asserted that women of higher gravidity (and parity) tend to initiate ANC late. This can lead to inadequate ANC.

4.3.2.4 Past experiences

Ninety-five (79.2%) of the sample had no past experience which could be identified as having an influence on preterm birth or ANC adequacy. Two (1.7%) of the women had previous hospital admission of the neonate, 1 (0.8%) had a past miscarriage together with a still birth and 15 (12.5%) had a past miscarriage.

Table 4.28: Pregnancy outcome and past experiences (N=120)

Past experience	Preterm	Full term	Total
None	29	66	95
Previous admission of neonate	2	0	2
Past miscarriage and still birth	1	0	1
Past miscarriage	3	12	15
Previous preterm, past miscarriage and previous admission of neonate.	1	0	1
Previous preterm	4	2	6
Total	**40**	**80**	**120**

In addition, 1 (0.8%) had a previous preterm birth, a past miscarriage and a previous admission of the neonate, and 6 (5%) had a previous preterm delivery. Twenty-nine (30.5%) of the women with no past adverse experience delivered prematurely, whilst the remaining 66 (69.5%) delivered at full term. Both (100%) women with a history of a previous hospital admission of a neonate delivered prematurely. The only woman with a history of a previous miscarriage and a still birth delivered prematurely. The only woman with a history of previous preterm, past miscarriage and previous admission of neonate delivered before term. Of the women who had a past miscarriage, 3 (20%) delivered prematurely and 12 (80%) delivered at term. Four (66.7%) of the 6 women who had a history of a previous miscarriage delivered preterm whilst 2 (33.3%) delivered at term (see Table 4.28 above). Generally a bad obstetric history increased the chances of a

preterm delivery. Of note however is that a history of only a past miscarriage did not increase the chances of a preterm delivery.

APNCU and past experiences: Of the 95 women with no past experience, 2 (2.1%) had adequate plus ANC, 6 (6.3%) had adequate ANC, 22 (23.2%) had intermediate ANC and 65 (68.4%) had inadequate ANC. Of the 2 women with a previous experience of admission of the neonate, 1 (50%) had intermediate ANC, whereas the other (50%) had inadequate ANC. The woman with a previous experience of both a past miscarriage and a still birth had intermediate ANC. Of the women with a history of a past miscarriage, 6 (40%) had intermediate ANC and 9 (60%) had inadequate ANC. The only woman with a previous preterm, past miscarriage and previous admission of a neonate had inadequate ANC. All 5 (100%) women with a previous preterm had inadequate ANC (see Table 4.29 below). Despite the fact that a bad obstetric risk increased the chances of a preterm delivery, most women with a bad obstetric history had inadequate ANC. Women with a history of a past miscarriage seemed more likely to seek ANC than others as evidenced by a higher percentage of such women being assigned to the intermediate ANC category.

Table 4.29: APNCU and past experiences (N=120)

Past experience	Adequate plus	Adequate	Intermediate	Inadequate	Total
None	2	6	22	65	95
Previous admission of the neonate	0	0	1	1	2
Past miscarriage and still birth	0	0	1	0	1
Past miscarriage	0	0	6	9	15
Previous preterm, past miscarriage and previous admission of a neonate	0	0	0	1	1
Previous preterm	0	0	0	5	6
Total	**2**	**1**	**30**	**81**	**120**

Table 4.30: CTP and past experiences (N=120)

Past experience	Appropriate	Sufficient	Intermediate	Inadequate	Total
None	2	3	13	77	95
Previous admission of a neonate	0	0	0	2	2
Past miscarriage and still birth	0	0	0	1	1
Past miscarriage	0	0	5	10	15
Previous preterm, past miscarriage and previous admission of a neonate	0	0	0	1	1
Previous preterm	0	0	1	5	6
Total	**2**	**3**	**19**	**96**	**120**

CTP and past experiences: Of the women with no past experience, 2 (2.1%) had appropriate ANC, 3 (3.2%) had sufficient ANC, 13 (13.7%) had intermediate ANC and 77 (81.1%) had inadequate ANC. Both (100%) women with a history of pervious admission of a neonate had inadequate ANC. The only woman with a past miscarriage and a still birth had inadequate ANC. Ten (66.7%) women with past miscarriage had inadequate ANC, whereas the other 5 (33.3%) had intermediate ANC. The only woman with previous preterm together with a past miscarriage and a previous admission of a neonate had inadequate ANC. Of the women with a previous preterm, 1 (16.7%) had intermediate ANC, whilst 5 (83.3%) had inadequate ANC (see Table 4.30 above). Women with a past obstetric history did not have an increased chance of ANC adequacy compared to those with no obstetric history.

The findings are contrary to what Zhao et al (2012: 6) postulated. The authors stated that past obstetric history (among other factors) had an association with ANC adequacy.

4.3.2.5 Current experiences

Table 4.31: Pregnancy outcome and current experiences (N=120)

Current experience	Preterm	Full term	Total
None	29	70	99
High blood pressure	9	6	15
Preterm contractions	1	1	2
Hospital admissions	1	1	2
Anaemia	0	2	2
Total	**40**	**80**	**120**

Ninety-nine (82.5%) of the women had no current experience (during pregnancy) which could be regarded as having an influence on preterm birth or ANC adequacy. Fifteen (12.5%) women had high blood pressure, 2 (1.7%) had preterm contractions, 2 (1.7%) had hospital admissions and 2 (1.7%) had anaemia. Twenty-nine (29.3%) of the women with no adverse experience during pregnancy delivered prematurely, whilst 70 (70.7%) delivered at term. Nine (60%) of the women who had high blood pressure during pregnancy delivered prematurely, whilst 6 (40%) with the same delivered at full term. Of the women who had preterm contractions during pregnancy, half delivered prematurely, whilst the other half delivered at term. Both (100%) women who had experienced anaemia during pregnancy delivered at term (see Table 4.31 above). The adverse experience during pregnancy which resulted in an increased risk of preterm birth was high blood pressure. This is supported by WHO (2014:2), who listed high blood pressure as one of the causes of preterm birth.

Table 4.32: APNCU and current experiences (N=120)

Current experience	Adequate plus	Adequate	Intermediate	Inadequate	Total
None	0	4	25	70	99
High blood pressure	1	3	5	6	15
Preterm contractions	1	0	0	1	2
Hospital admissions	0	0	0	2	2
Anaemia	0	0	0	2	2
Total	**2**	**7**	**30**	**81**	**120**

Table 4.33: CTP and current experiences (N=120)

Current experience	Appropriate	Sufficient	Intermediate	Inadequate	Total
None	1	0	17	81	99
High blood pressure	1	1	1	11	15
Preterm contractions	0	1	1	0	2
Hospital admissions	0	0	0	2	2
Anaemia	0	0	0	2	2
Total	**2**	**2**	**19**	**96**	**120**

APNCU and current experiences: Of the 99 women with no adverse experience during pregnancy, none (0%) had adequate plus ANC, 4 (4%) had adequate ANC, 25 (25.2%) had intermediate ANC and 70 (70.7%) had inadequate ANC. Of the women with high blood pressure, 1 (6.7%) had adequate plus ANC, 3 (20%) had adequate ANC, 5 (33.3%) had intermediate ANC and 6 (40%) had inadequate ANC. Of the 2 women with preterm contractions, 1 (50%) had adequate plus ANC and the other (50%) had inadequate ANC. Both (100%) women who were once admitted during their pregnancy had inadequate ANC and both (100%) women who had anaemia had inadequate ANC (see Table on page 70). More of the women with high blood pressure were found to receive more adequate ANC compared to others. This could be because generally women with high blood pressure tend to be given more frequent follow up dates and they tend to adhere to the follow up dates.

CTP and current experiences: Of all the women who had no adverse experience during pregnancy, 1 (1%) had appropriate ANC, none (0%) had sufficient ANC, 17 (17.2%) had intermediate ANC and 81 (81.8%) had inadequate ANC. The appropriate, sufficient and intermediate categories of ANC adequacy had 1 (6.7%) woman each from those with high blood pressure. From the 2 women with preterm contractions, 1 (50%) had sufficient ANC and the other one (50%) had intermediate ANC. Both (100%) women with hospital admissions had inadequate ANC and both (100%) with anaemia had inadequate ANC (see Table 4.33 above). When the CTP tool was applied, adverse pregnancy experiences did not seem to increase ANC adequacy.

4.3.3 The APNCU index in measuring antenatal care adequacy

4.3.3.1 Timing of initial visit

The average gestation at which women visited ANC was 18 weeks. Most women had their first ANC visit at 20 weeks. The minimum gestation at which women received their first ANC was 6 weeks and the maximum was 38 weeks.

Table 4.34: Gestation at first visit (N=117)

N Valid	117
Missing*	3
Mean	18.46
Median	19.00
Mode	20
Std. Deviation	6.918
Variance	47.854
Minimum	6
Maximum	38
Sum	2160

*These women had no ANC prior to delivery

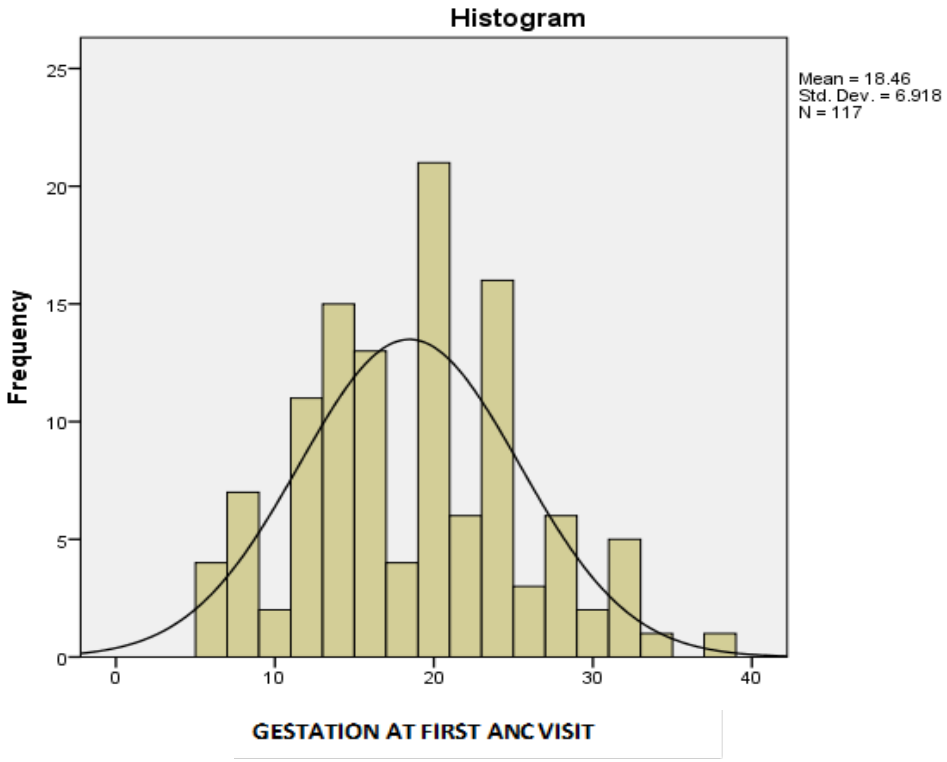

Figure 4.5: Gestation at first ANC visit frequency distribution (N=117)

Initiation of ANC was noted to be generally after the first trimester (see Table 4.34 on page 72). These findings are supported by the MoHSS and Macro International Incorporated (2008:19) who reported in the NDHS 2006 and 2007, that more than 60% of women initiated ANC after the first trimester. In addition, Kyei et al (2012:7) found that of the women who received good quality ANC, only 8% attended in the first trimester.

Table 4.35: Timing of initial visit according to APNCU and pregnancy outcome (N=120)

ANC visit	Preterm	Full term	Total
After 4th month	21	44	65
Before 4th month	8	32	40
Equal to 4th month	8	4	12
Never	3	0	3
Total	**40**	**80**	**120**

Sixty-five (54.2%) women initiated ANC after the 4th month. Forty (33.3%) women initiated ANC before the 4th month. Three (2.5%) women never initiated ANC. Twelve (10%) women initiated ANC at 4 months. Twenty-one (32.3%) of the women who initiated ANC after the 4th month delivered prematurely, 44 (67.7%) of the women who initiated ANC after the 4th month delivered at term. Of the women who initiated ANC before the 4th month, 8 (20%) delivered preterm whilst 32 (80%) delivered at full term. Of the women who initiated care at 4 months, 8 (66.7%) delivered preterm and 4 (33.3%) delivered at term. All women who never initiated care delivered prematurely see Table 4.35 above). Women who initiated ANC at exactly 4 months were handled as having started ANC before 4 months so as to enable categorisation according to the APNCU index.

4.3.3.2 Total number of ANC visits

The minimum number of visits was 0 and the maximum was 12. The average number of ANC visits was 4.66 and most women had 4 ANC visits, which is the minimum recommended by the WHO (see Table 4.36 below). This is, however, no consolation since studies have shown that quantity alone is not enough when it comes to ANC adequacy.

Table 4.36: Total number of ANC visits measures of central tendency (N=120)

N	120
Mean	4.66
Median	4.00
Mode	4
Std. Deviation	2.417
Variance	5.840
Minimum	0
Maximum	12
Sum	559

In a study by Zhao et al (2012:7) in Nepal, although half of the women were found to have had at least 4 ANC visits, only 24% received good quality ANC. In Namibia, the MoHSS and Macro International Incorporated (2008:19) reported in the 2006 and 2007 NDHS that 95% of pregnant women received ANC at least once, whilst 70% attended ANC at least four times during their pregnancy.

Table 4.37: Pregnancy outcome and ANC number of visits (N=120)

Number of ANC visits	Preterm	Full term	Total
Above average	7	49	56
Below average	30	31	61
Non attendance	3	0	3
Total	**40**	**80**	**120**

For about 56 (46.7%) of the women, the number of ANC visits was above average, for 61 (50.8%) it was below average and 3 did not attend ANC. Seven (12.5%) of the women who attended ANC more than the average number of times delivered prematurely and 49 (87.5%) delivered at term. Thirty (49.2%) of the women who had visited ANC below the average number of times had preterm deliveries and 31 (50.8%) had full term deliveries. All the 3 women who did not attend ANC delivered prematurely. Women who had visited ANC above the average number of times were more likely to deliver at full term (see Table 4.37 above). These findings support the postulation by Ajibade et al (2013:190) who stated that during ANC, interventions give health workers the opportunity to detect risky conditions in pregnant women and therefore refer them

for early management leading to better pregnancy outcomes such as term births can be carried out.

4.3.3.3 ANC adequacy according to APNCU index

Table 4.38: ANC adequacy according to APNCU index and pregnancy outcome (N=120)

Pregnancy outcome	Adequate plus	Adequate	Intermediate	Inadequate	Total
Preterm	2	5	7	26	40
Full term	0	2	23	55	80
Total	**2**	**7**	**30**	**81**	**120**

As is shown in Figure 4.6 (below) and Table 4.38 (above), from the total sample, 2 (1.7%) had adequate plus ANC, 7 (5.8%) women had adequate ANC, 30 (25%) had intermediate ANC and 81 (67.5%) had inadequate ANC. From the cases, 2 (5%) had adequate plus ANC, 5 (12.5%) had adequate ANC, 7 (17.5%) intermediate ANC and 26 (65%) had inadequate ANC. From the controls, none (0%) had adequate plus ANC, 2 (2.5%) had adequate ANC, 23 (28.8%) had intermediate ANC and 55 (68.8%) had inadequate ANC. Both (100%) women with adequate plus ANC had preterm deliveries. Of the 7 women who had adequate ANC, 5 (71.4%) had preterm birth and 2 (28.6%) had full term birth. Twenty-three (76.7%) of the women who had intermediate ANC had full term deliveries, whilst 7 (23.3%) had full term deliveries. Of the women who had inadequate ANC, 55 (67.9%) had full term deliveries and 26 (32.1%) had preterm deliveries.

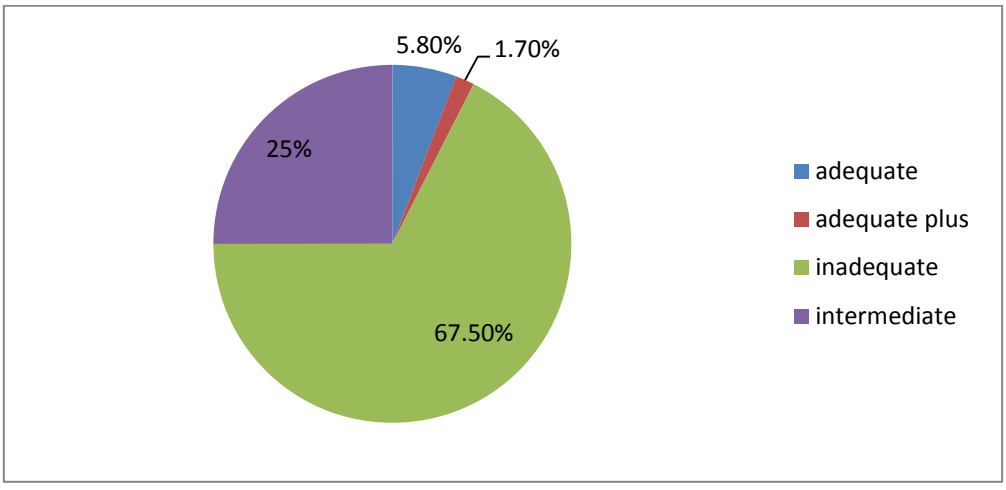

Figure 4.6: ANC adequacy according to APNCU index (N=120)

Women in the higher categories of care, that is adequate or adequate plus ANC were about 8 times less likely to give birth prematurely (OR 0.121; 95% CI 0.124–0.613) as compared to those in the lower categories. When adjusted for confounders, the association was still pronounced though it dropped slightly with the odds ratio at 0.128 (95% CI 0.006–0.312) for women in the higher categories of care (see Table 4.39 below). Beeckman et al (2012a:369), however, found no significant association between ANC adequacy and preterm birth when the APNCU index was used.

Table 4.39: Association between received antenatal care and preterm birth

	Odds ratio (95% CI)	
APNCU category	**Unadjusted**	**Adjusted ***
Inadequate or intermediate	1	1
Adequate or adequate plus	0.121 (0.024 - 0.613)	0.128 (0.006-0.312)

**The confounders considered were; age, marital status, parity, gravidity, occupation, level of education, residential area (in or outside Windhoek), past experiences and current experiences.

4.3.4 The CTP tool in measuring ANC adequacy

4.3.4.1 Timing of initial visit

Table 4.40: Timing of initial visit according to CTP and pregnancy outcome (N=120)

Initial visit	Preterm	Term	Total
After 14 weeks	29	49	78
Before 14 weeks	8	29	37
At 14 weeks	0	2	2
Never	3	0	3
Total	**40**	**80**	**120**

Seventy-eight (65%) of the women initiated ANC after 14 weeks whilst 37 (30.8%) initiated ANC before 14 weeks, 2 (1.7%) initiated at 14 weeks and 3 (2.5%) never visited ANC. Women who initiated ANC at exactly 14 weeks were considered as having initiated before 14 weeks when the categorisation of ANC adequacy was done. Of those who initiated care after 14 weeks, 29 (37.2%) delivered prematurely and 49 (62.8%) delivered at full term. Eight (21.6%) of the women who initiated care before 14

weeks delivered prematurely, whilst 29 (78.4%) delivered at full term. Both (100%) women who initiated care at 14 weeks delivered at term. All women who never had ANC delivered prematurely (see Table 4.40 above and Figure 4.7 below). Women who initiated care late were more likely to deliver prematurely.

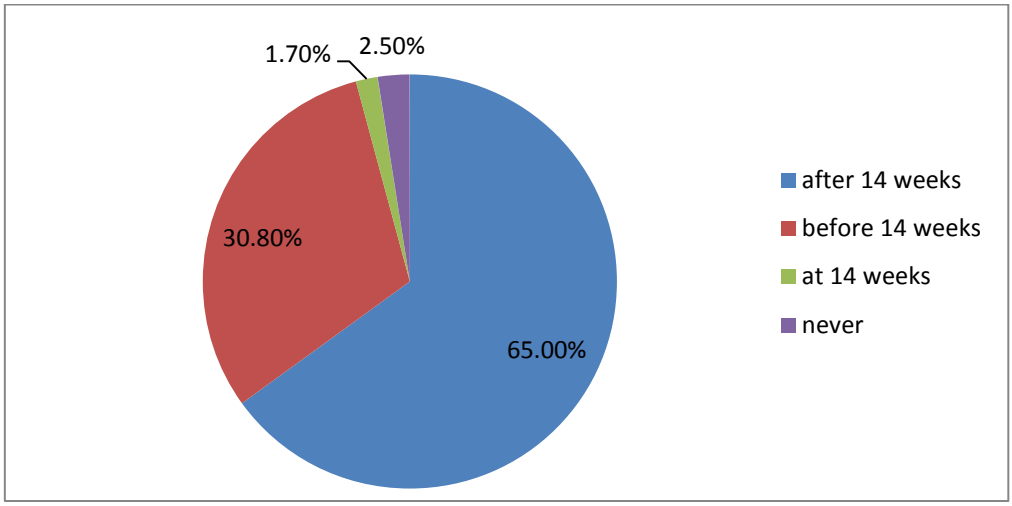

Figure 4.7: Timing of initial ANC visit according to CTP (N=120)

4.3.4.2 Interventions during ANC visits

Table 4.41: Summary of interventions done during ANC visits (n=120)

	Blood pressure measurements	Blood samples taken	Ultrasound scans done
N	120	120	120
Mean	4.5917	1.1083	1.1083
Median	4.0000	1.0000	1.0000
Mode	4.00	1.00	1.00
Std. Deviation	2.30635	.46374	.98558
Variance	5.319	.215	.971
Minimum	.00	.00	.00
Maximum	10.00	3.00	6.00
Sum	551.00	133.00	133.00

The average of blood pressure measurements for the sample was 4.59 and most women had their blood pressure measured 4 times. The minimum for blood pressure measurement was 0 and the maximum was 10. The average number of times blood sampling was done was 1.1 and most women had their blood sample taken once. The

minimum number of times blood sampling was done was 1 and the maximum was 3. The average number of times ultrasound scanning was done was 1.1 and most women had an ultrasound scan once. The minimum number of times ultrasound scan was done was 0 and the maximum was 6 (see Table 4.41 above). On average the interventions occurred for less than the minimum number of times considered ideal when the CTP tool is applied. According to Beeckman et al (2012a:367), the minimum number of times are at least 6 for BP measurements, at least 2 blood samples and at least 2 ultrasound scan interventions.

4.3.4.2.1 Blood pressure

Table 4.42: Pregnancy outcome and blood pressure measurement (N=120)

Blood pressure measurements	Preterm	Full term	Total
Above average	7	49	56
Below average	30	31	61
Not checked	3	0	3
Total	**40**	**80**	**120**

Fifty-six (46.7%) women had above average BP measurements, of which 7 (12.5%) delivered preterm and 49 (87.5%) delivered at term. Sixty-one (50.8%) women had below average BP measurements of which 30 (49.2%) had preterm deliveries and 31 (50.8%) had full term births. Three (2.5%) women had no blood pressure monitoring done (these women did not receive ANC), and all 3 had preterm deliveries (see Table 4.42 above). Among the women who had above average BP measurements, the probability of a preterm delivery was less. Blood pressure measurement is done routinely with every ANC visit and as was seen earlier, more ANC visits resulted in term births, thus it follows that more blood pressure measurements are seen as reducing the likelihood of preterm delivery.

4.3.4.2.2 Ultrasound scan

Twenty-three (19.2%) women had above average ultrasound scan monitoring. Of these, 7 (30.4%) had preterm deliveries and 16 (69.6%) had full term deliveries. Of the 70 (58.3%) women with below average ultrasound scan monitoring, 19 (27.1%) delivered prematurely, 51 (72.8%) delivered at full term. Twenty-seven (22.5%) women never had

an ultrasound scan and of these, 14 (51.8%) had preterm deliveries whilst 13 (48.1%) had full term deliveries. Ultrasound scan interventions showed no influence on preterm birth (see Table 4.43 below).

Table 4.43: Pregnancy outcome and ultrasound scan (N=120)

Ultrasound scan interventions	Preterm	Full term	Total
Above average	7	16	23
Below average	19	51	70
Not checked	14	13	27
Total	**40**	**80**	**120**

4.3.4.2.3 Blood samples taken

Table 4.44: Pregnancy outcome and blood samples taken (N=120)

Blood sample taken	Preterm	Full term	Total
Above average	4	8	12
Below average	33	72	105
Not checked	3	0	3
Total (blood)	**40**	**80**	**120**

Twelve (10%) women had their blood samples taken above the average number of times, 105 (87.5%) had samples taken below the average number of times and 3 (2.5%) had no blood samples taken. Four (33.3%) of those who had blood samples taken above the average number of times delivered prematurely and 8 (66.7%) delivered at term. Thirty-three (31.4%) of the women whose blood samples were taken below the average number of times delivered before term, whilst 72 (68.6%) delivered at term. All the 3 women who did not have blood samples taken at all (these did not visit ANC) delivered prematurely (see Table 4.44 above). Except for the 3 women who had no blood samples taken, the probability of delivering prematurely within the women whose blood samples were taken more than the average number of times was almost the same as that of the women who had blood samples taken less than the average number of times.

Table 4.45: Summary of all interventions per trimester

	T1 BP	T1 U	T1 BS	T2 BP	T2 U	T2 BS	T3 BP	T3 U	T3 BS
N Valid	37	24	34	98	61	71	105	29	25
Missing	83	96	86	22	59	49	15	91	95
Mean	1.16	1.04	1.00	1.83	1.16	1.06	3.17	1.31	1.04
Median	1.00	1.00	1.00	2.00	2.00	1.00	3.00	1.00	1.00
Mode	1	1	1	2	1	1	2	1	1
Std. Deviation	0.442	0.204	0.000	0.800	0.454	0.232	1.757	0.541	0.200
Variance	0.195	0.042	0.000	0.640	0.206	0.054	3.086	0.293	0.040
Minimum	1	1	1	1	1	1	1	1	1
Maximum	3	2	1	5	3	2	10	3	2
Sum	43	25	34	179	71	75	333	38	26

*T=Trimester; U=ultrasound scan; BP=blood pressure; BS=blood sample

4.3.4.3 ANC adequacy according to CTP tool

Table 4.46: ANC adequacy according to CTP tool and pregnancy outcome (N=120)

Pregnancy outcome	Appropriate	Sufficient	Intermediate	Inadequate	Total
Preterm	2	2	1	35	40
Full term	0	1	18	61	80
Total	**2**	**3**	**19**	**96**	**120**

From the cases, 2 (5%) women had appropriate ANC, 2 more (5%) had sufficient ANC, 1 (2.5%) woman had intermediate ANC, whilst 35 (87.5%) had inadequate ANC. From the controls, none (0%) had appropriate ANC, 1 (1.3%) had sufficient ANC, 18 (22.5%) had intermediate ANC and 61 (76.3%) had inadequate ANC. The 2 (100%) women with appropriate ANC delivered prematurely. Two (66.7%) women with sufficient ANC delivered preterm and 1 (33.3%) delivered at full term. From the women with intermediate ANC, 1 (5.3%) delivered prematurely and 18 (94.7%) delivered at term. Thirty-five (36.5%) women with inadequate ANC delivered prematurely and 61 (63.5%) delivered at full term (see Table 4.46 above).

Table 4.47: Association between received antenatal care and preterm birth

	Odds ratio (95% CI)	
CTP categories	**Unadjusted**	**Adjusted ***
Inadequate or intermediate	1	1
Sufficient or appropriate	0.114 (0.012-1.056)	0.042 (0.011-1.517)

**The confounders considered were; age, marital status, parity, gravidity, occupation, level of education, residential area (in or outside Windhoek), past experiences and current experiences.

Women in the higher categories of care, that is sufficient or appropriate ANC, were about 8 times less likely (OR 0.114; 95% CI 0.012–1.056) to give birth prematurely as compared to those in the lower categories. When adjusted for confounders, the odds of giving birth prematurely dropped significantly to an odds ratio of 0.042 (95% CI 0.011 - 1.517) for women in the higher categories of care (see Table 4.47 above). This is supported by Beeckman et al (2012a:369) who found that the odds of having a preterm birth in women in the appropriate and sufficient group was less likely than it was for women in the intermediate or inadequate group.

4.4 CONCLUSION

In Chapter 4 the results were presented and findings were explained. The results were presented under the following main areas; sample demographics (personal characteristics), pregnancy related characteristics, APNCU index in measuring ANC and finally the CTP tool in measuring ANC adequacy.

In this study the influence of marital status on ANC adequacy was not so evident and this was seen to be in contrast with other studies that have showed that marriage, among other factors was associated with reduced risks of late ANC attendance. Being employed or being a student decreased the probability of a preterm delivery. In terms of residency, the cases were equally divided between Windhoek and outside Windhoek. Most of the controls, however, were from within Windhoek. A woman staying in the high density area had a slightly higher (22.3%) chance of delivering before term. A woman staying in Windhoek had a 0% chance of having received adequate plus ANC, whereas one staying outside Windhoek had a 7.4% chance of having received adequate plus ANC among other women of similar residency. According to the CTP tool, care was

likely to have been sufficient for a woman who came from outside Windhoek. Generally with a decreasing level of education, the probability of delivering prematurely increased. In addition, women with a higher level of education were more likely to be rated as having adequate plus, adequate or intermediate ANC as compared to women with lower levels of education. The probability of having received inadequate care was higher in the less educated group.

The chances of preterm deliveries increased with parity. When the APNCU index was applied, women with a higher parity were less likely to be assigned to a higher level of ANC adequacy. The quality of ANC decreased with increasing parity when the CTP tool was applied. ANC adequacy decreased with increasing gravidity. Generally a bad obstetric history increased the chances of a preterm delivery. Of note however is that a history of only a past miscarriage did not increase the chances of a preterm delivery. Despite the fact that a bad obstetric risk increased the chances of a preterm delivery, most women with a bad obstetric history had inadequate ANC. Women with a past obstetric history did not have an increased chance of ANC adequacy compared to those with no obstetric history. However, women with a history of a past miscarriage seemed more likely to seek ANC than others. The adverse experience during pregnancy which resulted in an increased risk of preterm birth was high blood pressure. When the CTP tool was applied, adverse pregnancy experiences did not seem to increase ANC adequacy except for high blood pressure.

Initiation of ANC was noted to be generally after the first trimester. The average number of ANC visits was 4.66 and most women had 4 ANC visits, which is the minimum recommended by the WHO. Women who had visited ANC above the average number of times were more likely to deliver at full term. Women who initiated care late were more likely to deliver prematurely. On average the interventions occurred less than the minimum number of times considered ideal when the CTP tool was applied. Among the women who had above average BP measurements, the probability of a preterm delivery was less. Ultrasound scan interventions showed no influence on preterm birth. Except for the 3 women who had no blood samples taken, the probability of delivering prematurely within the women whose blood samples were taken more than the average was almost the same as that of the women who had blood samples taken less than the average number of times.

When the APNCU index was applied, premature birth was found to be less likely for women in the higher categories of care, that is adequate or adequate plus (OR 0.121; 95% CI 0.124–0.613), as compared to those in the lower categories. The association was still noted when adjusted for confounders with the odds ratio at 0.128 (95% CI 0.006–0.312) for women in the higher categories of care. Similarly, when the CTP tool was used, women in the higher categories of care, that is sufficient or appropriate ANC were less likely (OR 0.114; 95% CI 0.012–1.056) to give birth prematurely as compared to those in the lower categories. And when adjusted for confounders, the odds of giving birth prematurely dropped significantly to an odds ratio of 0.042 (95% CI 0.011−1.517) for women in the higher categories of care.

CHAPTER 5

SUMMARY, RECOMMENDATIONS, LIMITATIONS AND CONCLUSIONS

5.1 INTRODUCTION

In this last chapter, a discussion of the study findings is presented. The researcher starts off by summarising the research design and method, followed by a summary and interpretation of the study findings. The researcher then proposes some recommendations for clinical practice and further research. An outline of the contributions of the study is given and limitations of the study are stated. The chapter ends of with concluding remarks on the study.

5.2 RESEARCH DESIGN AND METHOD

In this study, the quantitative, descriptive, correlational, retrospective, case control design was used. Cases were defined as women aged 18 years and above with preterm new-borns and controls as women in the same age group with term new-borns. The outcome of interest was premature birth and exposure was antenatal care (ANC) adequacy.

The study setting was one referral state hospital in Windhoek. This hospital has a high number of pregnant women coming from within and around Windhoek and also from all parts of Namibia. The number of babies born alive at this hospital per month is approximately 250, with about 14.4% being preterm. This brought the total number of the accessible population to approximately 750 over the 3 month data collection period. The target population was represented by all women aged 18 and above who gave birth to live babies in Namibia.

Cases and controls were drawn from the accessible population. Data were sourced from antenatal care records of women who had delivered either a term baby or a preterm baby over the period March 2015 to June 2015. A couple of responses were elicited from the women; these were the level of education and history of previous admission of neonate into hospital. Records used were for women aged 18 and above

by the time of data collection. Since these records remain the property of the women during ANC and after delivery, the researcher sought permission to use the records from the women and also sampled and collected the data whilst the women were still in the postnatal ward.

The sample size was statistically calculated. Forty cases and 80 controls were used in a ratio of 1 case to 2 controls. Cases were sampled through consecutive sampling, whilst incidence density sampling was used to sample the controls. Cases and controls selected had to meet the eligibility criteria. Sampling and data collection occurred concurrently.

A checklist was used to collect data. The checklist was designed in such a way as to capture information on personal and pregnancy related characteristics, and ANC adequacy. Information related to ANC adequacy included the gestation when ANC was initiated, the number of visits each woman had and which interventions were received by each woman and when these interventions occurred.

After data were coded and entered into EPI info, analysis was done using SPSS version 20. Descriptive statistics were used to analyse personal and pregnancy related characteristics. The relationship between antenatal care adequacy and preterm birth was analysed using adjusted and unadjusted odds ratios.

5.3 SUMMARY AND INTERPRETATION OF THE RESEARCH FINDINGS

The purpose of the study was to investigate the relationship between ANC adequacy and preterm births. The objectives of this study were: to describe the adequacy of the ANC received by women who delivered at one state hospital in Windhoek between March 2015 and June 2015, and to determine the level of association between ANC adequacy and preterm birth.

The study was conducted at one state hospital which is also a referral hospital. Antenatal care adequacy was rated using both the Adequacy of Prenatal Care Use (APNCU) index and the Content and Timing of care in Pregnancy (CTP) tool. In overall, the findings of the study indicated that being in the upper categories of care

lessened the probability of delivering prematurely. The following paragraphs outline the findings from the study.

5.3.1 Sample demographics

From the findings of this study, the influence of marital status on ANC adequacy was not evident. However, the percentage of women who gave birth prematurely was slightly higher within the single women as compared to married women. The later observation supported findings by other researchers who concluded that marital status was one of the social factors associated with preterm birth. Marital status was found not to have an influence on ANC adequacy.

The occupational status of the women indicated an association with preterm birth. Preterm delivery was found to be more likely in the unemployed group followed by the employed group and less likely among students. Inversely, being employed or being a student decreased the probability of a preterm delivery. Within the group of employed women, the likelihood of having received adequate plus and adequate care was higher than it was for women within the other groups when the APNCU index was employed. The probability of having received intermediate care or adequate care was most likely within the employed group as compared to the other 2 groups when the CTP tool was applied. Thus the findings showed that being employed increased the likelihood of being given a higher category of ANC adequacy.

For a woman staying in the high density area, the chance of delivering before term was found to be higher as compared to that of a woman staying in a low or medium density area. This is indicative of a lower social status being associated with preterm birth. Care was likely to have been sufficient or adequate plus for a woman who came from outside Windhoek than for those staying within Windhoek. A plausible explanation could be that women who had been referred to this state hospital had problematic pregnancies which had warranted more intensive ANC.

Generally with the decreasing level of education, the probability of delivering prematurely increased within each educational level. Women with a higher level of education were more likely to be rated as having a higher category of care as compared to women with lower levels of education.

5.3.2 Pregnancy related characteristics

Generally the chances of preterm deliveries increased with parity. Women with a higher parity were less likely to be assigned to a higher level of ANC adequacy according to the APNCU index. The quality of ANC, measured using the CTP tool, decreased with increasing parity. The probability of preterm delivery varied from one gravidity group to the next. ANC adequacy decreased with increasing gravidity.

It emerged from this study that although an undesirable past obstetric history increased the chances of a preterm delivery, this history did not necessarily increase the chances of being assigned to a higher category of care.

High blood pressure during pregnancy resulted in an increased risk of preterm birth. Most of the women with high blood pressure were found to have received more adequate ANC compared to others. A most plausible explanation could be that generally women with high blood pressure tend to be given more intensive ANC especially in terms of the number of visits. When the CTP tool was applied, adverse pregnancy experiences did not increase ANC adequacy.

5.3.3 The APNCU index in measuring ANC adequacy

On average women visited ANC at 18 weeks. Most women had their first ANC visit at 20 weeks. Even though some women sought ANC as early as 6 weeks, some had their first ANC visit as late as 38 weeks. The average number of ANC visits was 4.66 and most women had 4 ANC visits, which is the minimum recommended by the WHO. Women who had visited ANC above the average number of times were more likely to deliver at full term. The odds of giving birth prematurely were lower for women in the higher categories of care than for women in the lower categories of care.

5.3.4 The CTP index in measuring ANC adequacy

An analysis on the timing of initial ANC visit was similar to when the APNCU index was applied. On average the interventions occurred less than the minimum number of times considered ideal when the CTP tool is applied. Among the women who had above average BP measurements, the chances of delivering prematurely were less.

Ultrasound scan interventions showed no influence on preterm birth. Blood sampling was also not found to have an association with preterm birth. Women in the higher categories of care, which is sufficient or appropriate ANC, had less odds of giving birth prematurely.

5.4 CONCLUSIONS

It emerged from the findings of this study that several factors had an influence on either preterm birth, antenatal care adequacy or both. Personal-related characteristics which were found to increase the chances of preterm delivery included being single, being unemployed, staying in a high density area and being less educated. Pregnancy related characteristics such as a high parity and an undesirable past obstetric history also increased the chances of delivering before term. Gravidity, however, did not have an effect on preterm delivery.

Although marital status did not have an influence on antenatal care adequacy, being employed, residing outside Windhoek and being more educated increased the chances of being assigned to higher categories of ANC. Pregnancy related characteristics which were found to be related to higher chances of being assigned to higher categories of care were lower parity, lower gravidity and high blood pressure. An undesirable obstetric history and adverse current pregnancy experiences had no effect on ANC adequacy.

When the APNCU index and the CTP tool were applied, the odds of delivering prematurely were higher in those assigned to lower categories of care. These findings can therefore help inform decisions on improving ANC and also lay a foundation for further research.

5.5 RECOMMENDATIONS

In view of the findings from this research, the researcher proposes the following recommendations:

1. For women

- Awareness campaigns encouraging early ANC booking, targeting women of child bearing age even before they become pregnant could contribute to an increase in the number of women who seek ANC early
- Health education should be intensified at every point of contact with women such as when they consult health care workers for other services such as family planning. The focus of such health education should be:
  - The importance of initiating ANC early
  - Advice on when to initiate ANC
- Health education to pregnant women on the following areas should be strengthened:
  - Dangers signs in pregnancy so that imminent preterm labour can be quickly managed.
  - The importance of early detection and management of sexually transmitted diseases including HIV so as to improve pregnancy outcomes.
  - Good nutrition to promote maternal wellbeing and foetal growth so as to improve pregnancy outcomes.
  - The importance of returning for follow up visits so as to benefit from the full ANC package.

2. For health care providers

- All health care workers should be able to do the following activities:
  - Screen for, and manage where possible, pregnancy conditions which are likely to cause adverse outcomes.
  - Refer promptly and efficiently women who need further management.
  - Provide services such as blood pressure measurement and blood sampling and for all pregnant women at appropriate times.

3. For research

- A similar research could be carried out in a different setting and the findings can be compared to findings from this study.
- As a follow up to the circular released by the MoHSS of Namibia, guidelines should also be published to facilitate uptake of FANC approach.
- Monitoring and evaluation of the FANC will shed some light on the extent of the implementation of this approach.
- Qualitative research can also be done to find out the perceptions of health care providers on the causes of substandard ANC.
- New tools should be designed to measure ANC adequacy in populations where FANC is established. These tools should take into consideration the four times that a woman is expected to visit ANC under this approach.

5.6 CONTRIBUTIONS OF THE STUDY

The following are expected contributions of the study:

- From the findings of this study, health caregivers can be informed on the aspects of antenatal care which can help reduce the incidence of preterm births.
- Study findings can be utilised by health policy developers in improving health policies so as to promote ANC adequacy especially by emphasising on the quality of care.
- The findings are also expected to be used in raising awareness among mothers on the importance of ANC regarding positive pregnancy outcomes, which are live healthy babies.
- Literature and any gaps in literature presented in this study lay a foundation for future research in this area.

5.7 SCOPE AND LIMITATIONS OF THE STUDY

- The intention was to collect data related to antenatal care adequacy and pregnancy outcome. However, the scope was broadened to include the analysis of the association of personal and pregnancy related characteristics with either antenatal care adequacy or pregnancy outcomes or both.
- Generalisation of the findings may be biased since data were only collected at one hospital which is based in an urban setting.
- The exclusion of minors could have led to selection bias since teenage pregnancy is quite significant in today's society.
- Missing information could have led to bias.
- Data collection was over a period of 3 consecutive months and this did not take into consideration seasonal variations in birth rate or health seeking behaviours.
- If funds and time were not constraints, the researcher would have preferred to use the whole accessible population.

5.8 CONCLUDING REMARKS

Preterm birth continues to be a worldwide problem. It significantly contributes to neonatal mortality and to co-morbidities associated with prematurity. In Namibia the preterm birth rate stands at 14.4%. Literature has shown that the risk of preterm birth is reduced in women who receive antenatal care (ANC) services due to interventions carried out during antenatal care such as blood pressure monitoring, laboratory screening and foetal monitoring through ultrasonography among others. Less than 7% of the pregnant women in the Khomas region of Namibia, where this study was conducted, receive ANC check-up during the first trimester and about 40% present only in the third trimester. The quantity (that is, number of ANC visits) and quality (that is, content of care) should be the focus in order to avert pregnancy complications such as preterm birth. With the introduction of FANC a minimum number of four visits is tailored to provide quality care by ensuring that at each visit comprehensive ANC services are provided. For Namibia, this approach could be of more benefit if guidelines on FANC are published and the programme monitored and evaluated so that implementation is not based only on a circular released by the MoHSS.

The researcher carried out this study with the purpose of investigating the relationship between ANC adequacy and preterm births. The probability of giving birth prematurely was found to be higher in those women assigned to lower categories of care. Thus major findings of this study supported some of the findings from literature, thereby indicating that there is still some work to be done to contribute to the reduction of the preterm birth rates through improved ANC services. Based on these findings, the researcher proposed some recommendations that could contribute to better ANC services so as to improve pregnancy outcomes.

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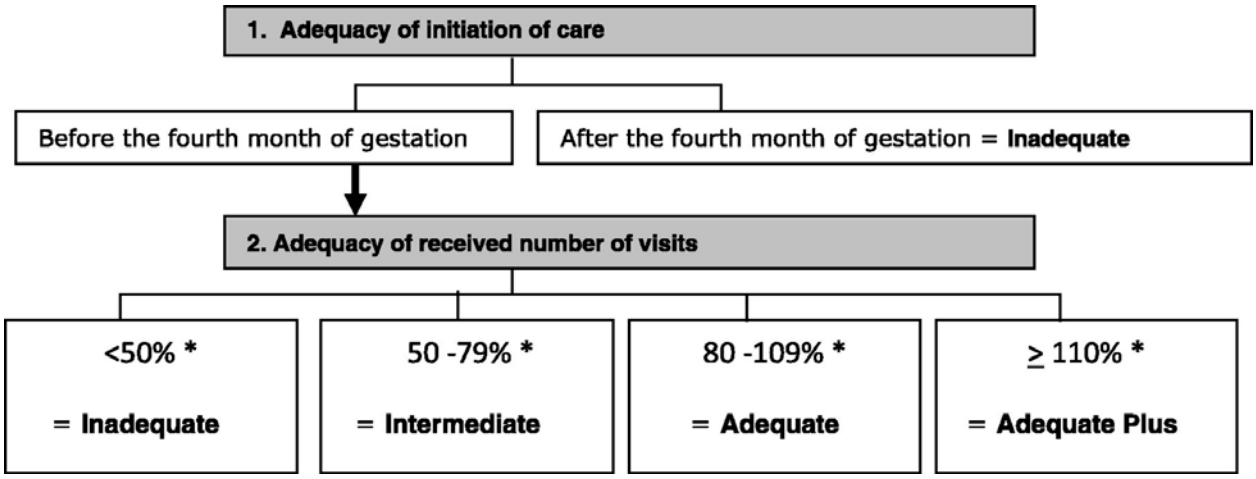
APPENDIXES

Appendix A

The APNCU index

THE APNCU INDEX



The relationship between antenatal care and preterm birth: the importance of content of care.

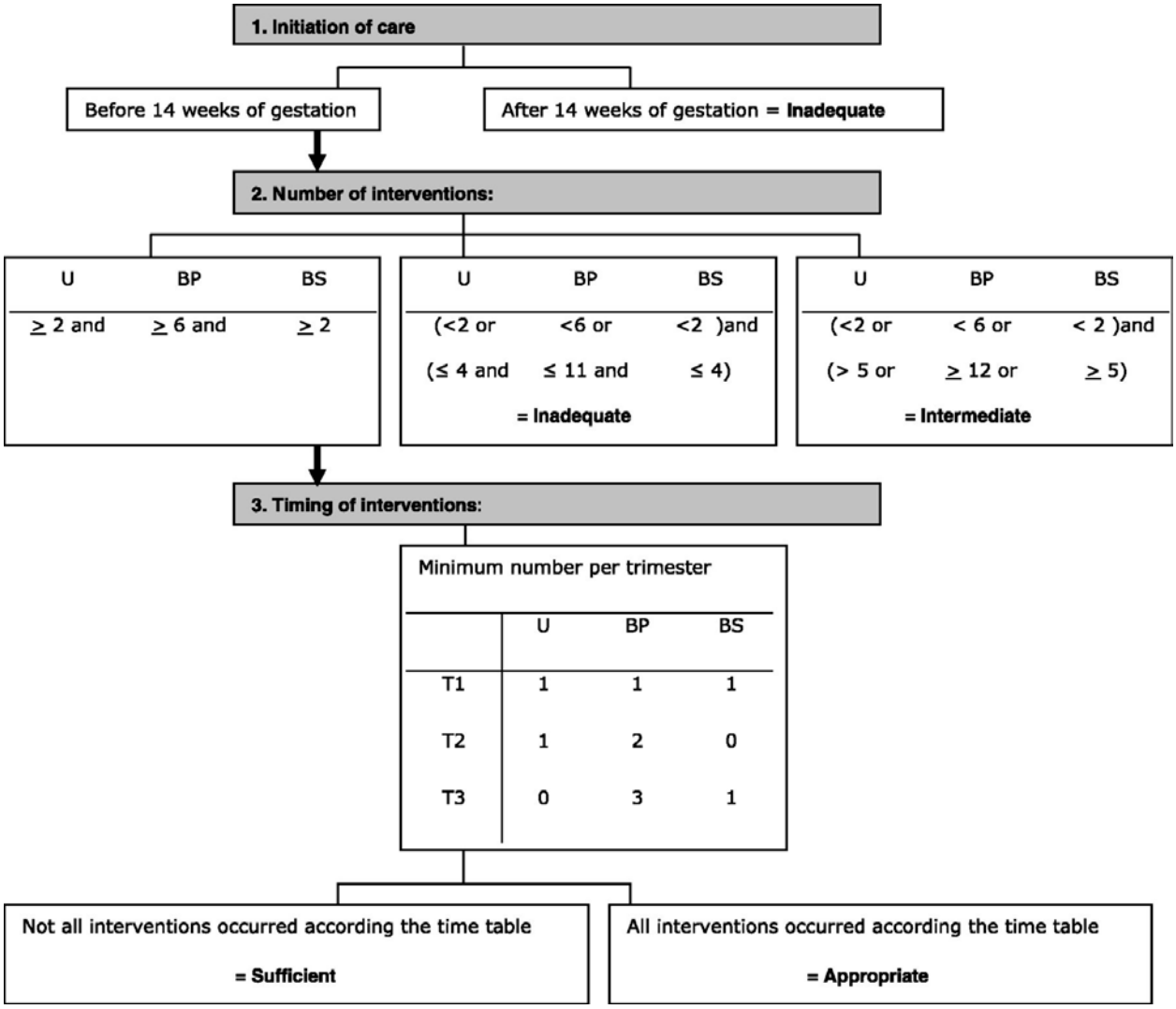
Adopted with from: Beekman, Louckx, Downe and Putman (2012:367)

(Permission to use the index granted by Dr M Kotelchuck)

Appendix B

The CTP tool

THE CTP TOOL



The relationship between antenatal care and preterm birth: the importance of content of care

Adopted with, permission, from: Beeckman, Louckx, Downe and Putman (2012:368).

Appendix C

Checklist

CHECKLIST

Code Name…….

Part A

1. Age

   …….years

2. Marital status

Married	
Single	
Divorced	
Widowed	

3. Occupation

   ……..

4. Place of residence stay

   ……

5. Highest level of education *

Primary	
Grade 10	
Grade 12	
Tertiary	
Not stated	
Other	

6. Gestation at delivery

   …….weeks

CASE	CONTROL

7. Parity (that is, number of viable births including still births)

   ……..

8. Gravidity (number of pregnancies carried including abortions and still births)

   …….

9. **Past pregnancy** experiences

Experience	**Yes**	**Year**	**No**
Previous preterm			
Past low birth weight baby			
Past miscarriage			
Still birth in the past			
Previous admission of baby into neonatal care*			

10. Experience with the **current pregnancy**.

Experience	**Yes**	**At how many weeks**	**No**
High blood pressure			
Diabetes in pregnancy			
Preterm contractions			
Hospital admissions			
Anaemia			

Part B

11. Gestation at first antenatal care visit

……..

12. Total number of antenatal care visits

……

CATEGORISATION OF ANC ADEQUACY ACCORDING TO APNCU INDEX:

Part C

13. Was the first antenatal care clinic visit before or after 14 weeks?

Before	
After	

14. Interventions per visit

No. of visit	Gestational age	My blood pressure was measured	I had an ultrasound scan done	A blood sample was taken from me
1st				
2nd				
3rd				
4th				
5th				
6th				
7th				
8th				
9th				
10th				

TOTAL NUMBER OF TIMES THE 3 INTERVENTIONS WERE DONE

Blood pressure……

Ultrasound scan……..

Blood sample…….

INTERVENTIONS PER TRIMESTER

	Blood pressure	Ultrasound scan	Blood sample
1ST Trimester			
2nd Trimester			
3rd Trimester			

CATEGORISATION OF ANC ADEQUACY ACCORDING TO CTP TOOL

*The responses to these items were elicited from the women.

Appendix D

Research information to mothers

RESEARCH INFORMATION TO MOTHERS.

You are being asked to allow the use of your ANC card / record in a study which seeks to describe the relationship between antenatal care adequacy and preterm birth. The study is being conducted by Sikhangezile Gwatikunda who is a student at the University of South Arica undergoing studies in Master of Arts in Nursing. The researcher is also a registered nurse by profession. The following demographic information will be obtained from your records: your age, occupation, marital status and place of residency. The other information that will be gathered from your card relates to pregnancy related characteristics such as parity (that is, number of births you have had), history of obstetric risk (that is previous preterm birth, low birth weight, miscarriage and / or still birth) and medical history during your recent pregnancy (that is high blood pressure, gestational diabetes, preterm contractions, hospital admission and anaemia). The number of antenatal care visits you had and what care you received during those visits prior to the birth of your new-born baby will be noted. In addition to using your card the researcher will ask you a couple of questions to get information on your level of education and history of admission of any of your babies into neonatal care since this information is not recorded in your card. This information will be obtained through the use of a checklist. If you agree to have the above information accessed you will be asked to sign an informed consent. You will not receive payment for the use of your information but you have the right to ask for a copy of the findings once the research has been concluded.

Thank you for your consideration.

Yours faithfully

Sikhangezile Gwatikunda

Appendix E

Informed consent

INFORMED CONSENT

Code name……..

I agree to have my ANC card / record used and to be asked a couple of questions in the research conducted by Sikhangezile Gwatikunda, a student at UNISA, which seeks to describe the relationship between antenatal care adequacy and preterm birth. I am informed that my name will not appear on the checklist nor will it be linked to the research findings. I understand it is my right to ask for a copy of the findings at the end of the study and that I am not going to be paid to for this gesture.

Signature……..

Signature of researcher ……

Date……..

For further information contact

Mrs Sikhangezile Gwatikunda

Box 980, Windhoek, Namibia

Phone: +264816505110

email khangegwati@yahoo.com

Appendix F

Ethical clearance

ETHICAL CLEARANCE

UNISA university of south africa

UNIVERSITY OF SOUTH AFRICA
Health Studies Higher Degrees Committee
College of Human Sciences
ETHICAL CLEARANCE CERTIFICATE

REC-012714-039

HSHDC/341/2014

Date: 8 October 2014 Student No: 4878-357-9

Project Title: A retrospective study regarding the relationship between ANC adequacy and preterm birth.

Researcher: Sikhangezile Gwatikunda

Degree: MA in Nursing Code: MPCHS94

Supervisor: Prof LM Modiba
Qualification: D Cur
Joint Supervisor: -

DECISION OF COMMITTEE

Approved [√] **Conditionally Approved** [ ]

Prof L Roets
FOR **CHAIRPERSON: HEALTH STUDIES HIGHER DEGREES COMMITTEE**

L.A. Roets (Prof)

Prof MM Moleki
ACADEMIC CHAIRPERSON: DEPARTMENT OF HEALTH STUDIES

PLEASE QUOTE THE PROJECT NUMBER IN ALL ENQUIRES

Appendix G

Letter to seek permission to collect data

LETTER TO SEEK APPROVAL TO CONDUCT RESEARCH

Box 980
Windhoek
Namibia
16 January 2015
The Permanent Secretary (Ministry of Health and Social Services)
Windhoek
Namibia

Ref: SEEKING OF APPROVAL TO CONDUCT A STUDY AT WINDHOEK CENTRAL HOSPITAL

Dear Sir

My name is Sikhangezile Gwatikunda and I am a master of arts in nursing student at the University of South Africa. As a requirement for the completion of my studies I am to submit a research in an area of nursing. My research topic is: A retrospective study regarding the relationship between antenatal care adequacy and preterm births. In order to describe this relationship I intend to collect data relating to when ANC is initiated and what care was provided to mothers. The intended site of study is Windhoek Central Hospital maternity department and the accessible population is women aged 18 and older with preterm and term newborn babies during the period of data collection. The provisional period of data collection is 1 February 2015 to 1 May 2015. Only women who consent to the use of the information on their ANC cards will be included in the study and anonymity will be maintained.
Attached to this letter is my research proposal.
Looking forward to a favourable response from you is,

Sikhangezile Gwatikunda.

Appendix H

Approval letter from the MoHSS

APPROVAL LETTER FROM MoHSS

REPUBLIC OF NAMIBIA

Ministry of Health and Social Services

Private Bag 13198
Windhoek
Namibia

Ministerial Building
Harvey Street
Windhoek

Tel: 061 – 203 2510
Fax: 061 – 222558
E-mail: hnangombe@gmail.com

OFFICE OF THE PERMANENT SECRETARY

Ref: 17/3/3
Enquiries: Ms. H. Nangombe

Date: 15 February 2015

Ms. S. Gwatikund
Box 980
Windhoek
Namibia

Dear Ms. Gwatikund

Re: Is there a relationship between Antenatal care adequacy and Preterm birth? : A case control study

1. Reference is made to your application to conduct the above-mentioned study.

2. The proposal has been evaluated and found to have merit.

3. **Kindly be informed that permission to conduct the study has been granted under the following conditions:**

3.1 The data to be collected must only be used for academic purpose;
3.2 No other data should be collected other than the data stated in the proposal;
3.3 A quarterly report to be submitted to the Ministry's Research Unit;
3.4 Preliminary findings to be submitted upon completion of the study;
3.5 Final report to be submitted upon completion of the study;
3.6 Separate permission should be sought from the Ministry for the publication of the findings.

PERMANENT SECRETARY
18 FEB 2015
Republic of Namibia
MINISTRY OF HEALTH AND SOCIAL SERVICES

Yours sincerely,

Andrew Ndishishi (Mr)
Permanent Secretary

"Health for All"

Appendix I

Approval letter data collection site

APPROVAL LETTER DATA COLLECTION SITE

REPUBLIC OF NAMIBIA

Ministry of Health and Social Services

Private Bag 13215 Windhoek Namibia	Harvey Street Windhoek Central Hospital	Tel. No: (061) 203 3024 Fax No: (061) 222886
Enquiries: Mrs. IIPINGE.	Ref.	Date : 12 March 2015

OFFICE OF THE MEDICAL SUPERINTENDENT

WINDHOEK CENTRAL HOSPITAL

Ms.S.GWATIKUNDA
P.O.BOX 980
Windhoek

Dear Ms. Gwatikunda

RE: PERMISSION TO DO A RESEARCH: IS THERE A RELATIONISHIP BETWEEN ANTENATAL CARE ADEQUACY AND PRETERM BIRTH FROM MATERNITY WARD AT WINDHOEK CENTRAL HOSPITAL.

1. Reference is made to the abovementioned subject:

2. Kindly be informed that permission has been granted under the following conditions.

2.1 Patients/ clients information should be kept confidential at all times.
2.2 The purpose for collecting data is only for your study purposes as you have requested and it does not include any remuneration.
2.3 Permission to be obtained from each individual patient going to be interviewed

Thank you for your kind gesture.

Yours sincerely

DR. S. SHALONGO
MEDICAL SUPERINTENDENT

MINISTRY OF HEALTH
AND SOCIAL SERVICES
PRIVATE BAG 13215
31 MAR 2015
WINDHOEK
NAMIBIA
WINDHOEK CENTRAL HOSPITAL

Approved

"Health for All"

Appendix J

Letter from statistician

LETTER FROM STATISTICIAN

PO Box 99355, Eros,
Windhoek,
Namibia
+264818665827

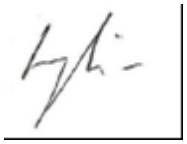
Department of Nursing Science
UNISA
17 October 2015

Dear Prof. LM Modiba

MASTERS IN NURSING DISSERTATION: MRS S GWATIKUNDA

This letter serves to confirm, that I, Leslie T Mavonyani a Data Analytics and Business Intelligence consultant assisted Mrs. S. Gwatikunda, in the analysis of data on the retrospective study regarding the relationship between antenatal care adequacy and preterm birth. The Data Analysis process involved the capturing of data from the 120 filled checklists using IBM SPSS Statistics version 20, classification and coding of the data provided. After successful data capture a few checks were done to ensure completeness and data quality and thereafter produced general descriptive statistics to establish the veracity of the data captured. Based on guidance provided by Mrs. S. Gwatikunda on the outcomes and confounding factors, the odds ratio and adjusted odds ratios were determined using Binary Logistic regression with IBM SPSS Statistics.

Sincerely yours



Leslie T. Mavonyani

Appendix K

Letter from language editor

LETTER FROM LANGUAGE EDITOR

ACET Consultancy
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9 November 2015

To whom it may concern

LANGUAGE EDITING – SIKHANGEZILE GWATIKUNDA

This letter serves to confirm that a Master's thesis titled A RETROSPECTIVE STUDY ON THE RELATIONSHIP BETWEEN ANTENATAL CARE ADEQUACY AND PRETERM BIRTH was submitted to me for language editing.

The thesis was professionally edited and track changes and suggestions were made in the document, which if followed by Mrs Sikangezile Gwatikunda will result in a thesis with a high standard of English.

Yours faithfully

Dr N. Mlambo

B. A. English & Linguistics
B. A. Special Honours in English – First class
M.A. in English
M.A. in Intercultural Communication – i.p.
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Appendix L

Letter from editor

(Technical presentation)

LETTER FROM EDITOR (TECHNICAL PRESENTATION)

TO WHOM IT MAY CONCERN

TECHNICAL EDITING

This letter serves to confirm that a Masters dissertation titled:

A RETROSPECTIVE STUDY ON THE RELATIONSHIP BETWEEN ANTENATAL CARE ADEQUACY AND PRETERM BIRTH

was technically formatted and edited.

Rina Coetzer